AMERICAN ARTISAN

A WEEKLY JOURNAL

OF

ARTS, MECHANICS, MANUFACTURES, ENGINEERING, CHEMISTRY, INVENTIONS,

AND

PATENTS.

VOLUME XIV., NEW SERIES.
JANUARY TO JUNE, 1872.

NEW YORK:
BROWN & ALLEN, PUBLISHERS AND PROPRIETORS, No. 189 BROADWAY

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VOLUME XIV. New Series. } NUMBER 1. NEW YORK, JANUARY 3, 1872. { $2 00 PER ANNUM IN ADVANCE. SINGLE COPIES, FIVE CENTS.

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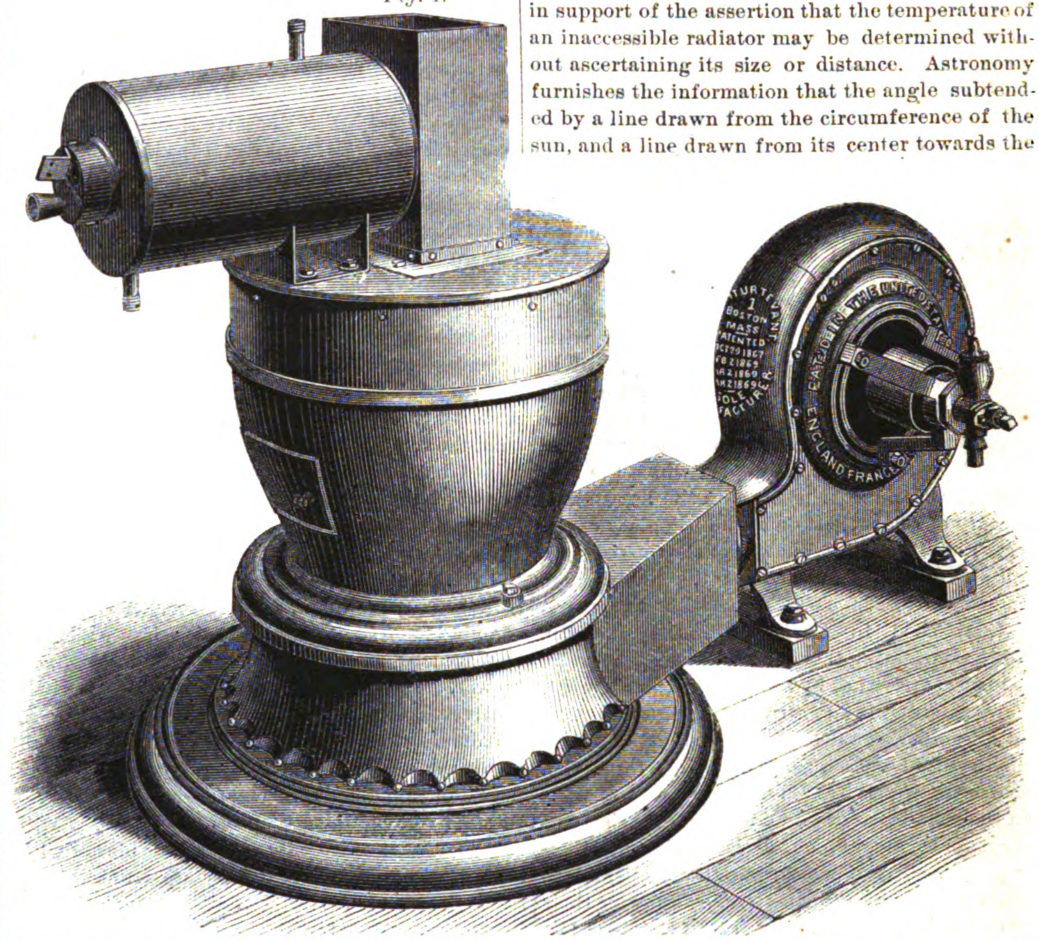
[Illustrations are indicated by an asterisk.]

RADIANT HEAT TRANSMITTED BY FLAMES.

BY CAPTAIN JOHN ERICSSON.

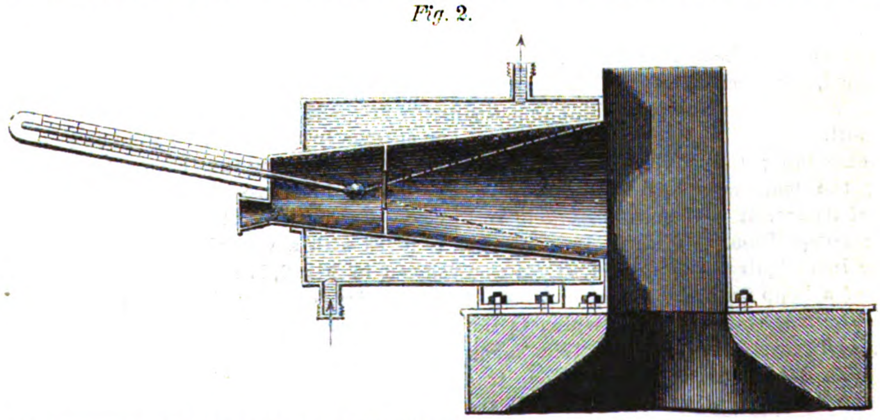
THE temperature produced by the radiation of flames, is a subject of far greater importance than generally supposed. Some distinguished physicists imagine that the radiant power of flames is considerably less than that of incandescent solid substances, contending that it is impossible to ascertain the temperature of the sun because the radiant heat transmitted is the result of the radiation of the incandescent gases of the photosphere. The accompanying illustration, Fig. 1, represents an apparatus originally constructed to demonstrate the unsoundness of this assumption, and to prove that the radiant power of flame is not less than that of incandescent solid bodies. In a practical point of view, an exact knowledge of the temperature produced by the radiant heat transmitted by flames, is of great importance, as it furnishes means of measuring, with desirable precision, temperatures which the nature of the materials at our command renders it impossible to ascertain by direct contact. It was shown in the article on Solar Heat, published in *Engineering*, December 30, 1870, that the intensities of circular radiators of *different* size, imparting equal temperature at *equal* distance from the radiating surface, are inversely as the squares of the sines of half of the subtended angles, that is, the angles formed by the axes of the circular radiant surfaces and the heat rays projected from the circumferences to the substance receiving the radiant heat, in the prolongation of the axes. It will be evident on reflection that, agreeably to this proposition, it is possible to determine the temperature of an inaccessible circular radiator *without knowing its size or distance.* The method of measuring temperature, which we are going to consider, depending solely on the correctness of the paradoxical proposition just stated, it will be necessary to subject the latter to some test of a practical nature before we proceed to examine in detail the device by which the radiant intensity, transmitted by a flame, is rendered subservient in determining its temperature. It will be seen by referring to the description of the solar pyrometer, contained in the article before referred to, that the radiant heat transmitted from a circular radiator of known size to the bulb of a thermometer applied at a known distance, within a vacuum, has been ascertained with critical nicety. It has been

Fig. 1.



shown that, with an angle of 16° 8′ subtended by the axis of the radiator and the heat rays project-

Fig. 2.



ed from the circumference towards the bulb, the temperature of the radiator will be 12·91 times that indicated by the thermometer receiving the radiant heat. This fixed relation between the angle subtended and the temperature transmitted is evidently of the utmost importance. In connection with the fact already noticed, that the intensities of radiators of different size are inversely as the squares of the sines of the subtended angles, it enables us to apply the proposed practical test in support of the assertion that the temperature of an inaccessible radiator may be determined without ascertaining its size or distance. Astronomy furnishes the information that the angle subtended by a line drawn from the circumference of the sun, and a line drawn from its center towards the earth when the latter is in aphelion, is very nearly 15′ 46″. The corresponding angle subtended by the radiator of the solar pyrometer and its axle being 16° 8′, it will be found by an easy calculation that the square of the sine of the angle sub-

tended by the sun, is to the square of the corresponding sine of the radiator of the pyrometer as 1 : 3685·71. The experiments with this instrument having established the fact before stated that the intensity of the radiating surface is 12·91 times greater than the temperature transmitted to the focal thermometer, it will be readily perceived that in order to raise the focal temperature to 84·84°, the temperature of the radiator must be $84{\cdot}84 \times 12{\cdot}91 = 1095{\cdot}28°$. And if we suppose its diameter to be reduced to such an extent that it subtends an angle of only 15′ 46″, like that subtended by the sun, it will be obvious that its temperature, owing to the small radiating surface, must be vastly increased to transmit a temperature of 84·84° to the focal thermometer. The foregoing explanation having demonstrated that the increase of temperature required under the stated conditions, will be inversely as the sines of the subtended angles, viz., 3685·71 : 1, it will be seen that the temperature of the diminished radiator must be $3685{\cdot}71 \times 1095{\cdot}28° = 4{,}036{,}884°$ in order to transmit the stated temperature of 84·84° to the focal thermometer. It scarcely needs explanation that the temperature last mentioned has been selected as a basis of our calculations on the ground that the intensity of solar radiation is 84·84° at the boundary of the atmosphere when the earth is in aphelion, in which position, it will be recollected, the before-mentioned angle—15′ 46″—is subtended. Consequently, the temperature of the sun, deduced from the data furnished by the results of the experiments with the solar pyrometer, without reference to the sun's distance or size, will be 4,036,884°. Now, computations based on the sun's distance and diameter, in accordance with the theory that the temperature produced by radiant heat is inversely as the areas over which the rays are dispersed, in connection with the ascertained intensity of solar radiation at the boundary of the terrestrial atmosphere, show that the temperature of the sun at the surface of the photosphere somewhat exceeds 4,035,500°. (See demonstration published in *Engineering*, December 30, 1870.) Considering this close agreement between the results arrived at by methods totally different, and considering the severity of the test applied, that of comparing the effect of radiant heat at a distance of 18 inches, to that acting through a space exceeding 90,000,000 miles, we cannot question the soundness of the doctrine enunciated at the commencement of our discourse, nor question the practicability of measuring the temperatures of distant inaccessible bodies without knowing their size or distance. The important fact should not be overlooked that our demonstration relates only to the temperature of *circular* radiators. But it will be shown hereafter that the temperature of radiators of an irregular form, whether consisting of incandescent metallic bodies or flames, may also be ascertained, irrespective of the distance and size of the radiating surface, provided that distance be short.

Before examining the adopted expedients of measuring the temperature transmitted by the radiation of flames, it will be necessary to consider their composition. Professor Draper, who has closely investigated the subject, states that the flame of a lamp consists of three principal divisions: First. A central nucleus which is not luminous, and consists of combustible vapor. Secondly. An intermediate portion, the true flame, arising from the reaction of the air and the combustible vapor, and being composed of a succession of superposed shells, the interior being red, the exterior violet, and the intervening ones colored in the proper order of refrangibility; the cause of this difference of color being the declining activity with which the combustion goes on deeper and deeper in the flame. As to temperature, Professor Draper considers that the inner red shell cannot be less than 977° Fahr., and the exterior violet one probably more than 2,500° Fahr. Thirdly. An envelope consisting of the products of combustion, exterior to the true flame, shining simply as an incandescent body, and its light for the most part overpowered by the brighter portion within. Apart from the difficulty of giving to such a flame as the one described the form necessary to render exact measurement of its radiant power possible, the result would be of little value owing to the want of homogeneity and uniformity of temperature. Our investigation, therefore, will be confined to what may be termed solid flames of uniform temperature throughout the mass, such, for instance, as the flames of reverberatory furnaces and cupolas surrounded by walls that prevent the action of the exterior atmosphere. Evidently, if we can ascertain what intensity of flame is indispensable to fuse a metal, we at the same time ascertain the temperature of the fused metal itself. It will be reserved for a future occasion, to present a delineation and description of an instrument by means of which the temperature of such flames may be measured for practical purposes; our present object is simply that of answering the theoretical question, Is the temperature transmitted by solid flames equal to, or less than, that transmitted by incandescent metallic bodies? The reader will bear in mind that this investigation was originally undertaken to refute the assertion of certain savants that, the temperature of the sun cannot be ascertained because the radiant power of incandescent gases is less than that of incandescent solid matter.

Fig. 1 on the opposite page represents a conical furnace provided with a grate applied at the contracted lower portion, admitting of a free passage of the air over the entire surface. A capacious chamber is formed under the grate, into which air is forced by an ordinary Sturtivant centrifugal blower. The internal portion of the furnace is contracted towards the top, as shown in Fig. 2, terminating with a square opening, over which is placed a square trunk corresponding exactly with the said opening. The furnace being charged with combustibles that readily ignite, it will be evident that a moderate speed of the blower will, soon after ignition, fill the square trunk with a solid flame of perfectly uniform temperature throughout, contact with the exterior atmosphere being wholly prevented, while the air which supports the combustion is subdivided almost infinitely, and uniformly dispersed, through the mass of burning fuel. A chimney of very large section, equal to that of the contracted part of the furnace, being applied above the square trunk, any tendency to pressure and accumulation in the same will be effectually prevented. A solid flame of uniform temperature having thus been obtained, its radiant power has been ascertained by the following device. A conical vessel open at the large end, surrounded with a water-jacket of cylindrical form, shown in Fig. 2, is secured to the square trunk, a circular opening being formed in the side of the latter, corresponding with the open end of the conical vessel. Referring to Fig. 2, it will be seen that a perforated diaphragm (composed of polished silver) is introduced near the small end of the conical vessel. A thermometer is applied near the circular perforation of the diaphragm, the bulb being placed exactly in the center line of the vessel. An opening, surrounded with a short conical tube, covered with a piece of mica, affords a view of the interior of the conical vessel. The water-jacket is supplied from the street main, a constant stream being kept up during experiments. The application of a chimney of large diameter above the square flame-trunk, and the covering of the short conical tube with mica, as stated, in order to prevent any current of heated air or gas through the conical vessel, have contributed to secure the desired result. A disk of flame of uniform brightness, the color varying with the speed of the blower, has been successfully produced. Respecting the experiments which have been instituted, it may be briefly stated that, when the blower is worked at the most advantageous speed for producing a flame of maximum brightness, the thermometer exposed to its radiant heat indicates 282°, while the temperature of the water circulating through the external casing is 73°. Hence, the heat transmitted to the inclosed thermometer by the radiation of the flame produces an augmentation of temperature of $282 - 73 = 209°$ Fahr. The angle subtended by the center line of the conical vessel and lines drawn from the circumference of the flame-disk to the bulb of the thermometer, being 16° 8′, precisely as in the solar pyrometer, we know that its temperature must be 12·91 times greater than that indicated by the inclosed thermometer. Accordingly, the temperature of the flame passing from the furnace through the square trunk into the chimney will be $12.91 \times 209 = 2698°$ Fahr., a result corresponding very nearly with ordinary pyrometer indications; a fact, however, of little importance in view of the uncertainty of such indications. It will be supposed that the stated high temperature of the flame must at once destroy the square trunk. Such, however, is not the case, from the reason that the trunk is made of plate-iron only 1-16 inch thick, the radiation of which is so rapid that the gases composing the flame—these gases being slow conductors—cannot communicate the heat as fast as it is carried off by radiation. The top of the furnace at the point where the flame is concentrated and conducted into the square trunk, being exposed to intense heat, is lined with fire-clay. It should be observed that the apparatus is exposed to a high temperature only while the blower is in operation, the motion being stopped as soon as the internal thermometer reaches maximum indication.

It will be noticed by those who have attentively studied the article on radiant heat published in *Engineering*, Nov. 25, 1870, that, unless the radiant surface forms a spherical concavity, the focus of which coincides with the center of the bulb of the recording thermometer, the indication will not be exact. The flame-disk being *circular*, this objection is overcome by removing the thermometer from the face of the flame to such a distance, that the mean length of the heat rays transmitted to the bulb corresponds with the radius of a concave radiator of the same diameter as the flame-disk, subtending the before-named angle of 16° 8′. As already mentioned, the consideration of the *practical application* of the principle developed by the apparatus represented by our illustration, almost self-evident to constructive minds, has been reserved for another occasion. In the meantime, engineers will be interested to learn that instruments are being constructed by means of which the temperature of metals, of any temperature, may be measured with positive accuracy by simply ascertaining their radiant power at a convenient but unknown distance.

The Austrian Torpedo.

MUCH has been said during the past year or two concerning the improved system of torpedoes adopted by the Austrian Government; but the descriptions given here, so far as we know, have been comparatively imperfect. The following from *Engineering* gives a comprehensive sketch of the construction of the device and of the experiments therewith, reaching, it will be seen, conclusions decidedly unfavorable to the inventor:—

"At a time like the present, when the torpedo is being so actively developed into a position which will unquestionably be a leading one in the naval warfare of the future, any new phase in the question becomes of equal interest and importance. Until very recently it was generally supposed that that question had been settled by the adoption of Captain Harvey's seamanlike otter torpedo for service afloat, and of the submerged electrical torpedoes designed by the Royal Engineers for stationary or coast service. We certainly shared this opinion in common with those who have for the past five years or so watched the gradual and satisfactory solution of the torpedo problem, and we were, therefore, not a little surprised to learn upon undoubted authority that our economical Government had given, or were about to give, £15,000 for a very ingenious toy torpedo of Austrian extraction. The history of this torpedo presents many points of interest, especially at the present time, when the invention is to become national property at the expense of the national purse; and we may at once express our decided opinion that no results have been yet obtained with it to justify the action of the Government.

"During the autumn of 1869 there might have been seen occasionally disporting itself in the waters at the little port of Fiume, in the Adriatic, a self-propelled mechanical fish, some 20 feet in length and of a form approximating to that of the swordfish. The idea of such a torpedo is due to one Captain Luppis, a retired officer of the Austrian navy, who proposed a moving and floating weapon, the forepart of which should be filled with explosive material, and the afterpart devoted to the motive power, which was originally intended to be steam. Such was the idea when it was communicated to Mr. Robert Whitehead, an English engineer resident at Fiume, where he held, and we believe still holds, the post of chief of an engineering establishment. Mr. Whitehead developed the surface torpedo into a submerged weapon, the propelling power of which was compressed air. He retained the form of the swordfish, but, besides a projecting snout, he gave it a vertical and two lateral projections—triggers, in fact—by which the mechine was exploded on contact. The snout acting also as a trigger, the weapon thus had four chances of exploding on hitting its mark. It is charged with any available powerful explosive compound, and can be propelled at any required depth below the surface of the water, at a maximum speed of 12 knots an hour.

"The head and shoulders of the fish now contain the charge, the body forming the engine-room and storehouse for the compressed air, which works an internal engine, by which an external four-bladed screw is actuated. It is fitted with fins for the purpose of guiding it through a tube attached to a torpedo ship, from which it is discharged into the sea for action. You have only—says the inventor in effect—to point the creature at its game, to cock its fins at the right angle, and to give it a pinch and a push, when off it will go with undeviating accuracy to the mark. Nay, more, it can be made to travel in any direction; to move at an upward or a downward angle; in horizontal plane; or to gyrate around a central point. Encouraged by such sanguine assurances, the Government purchased several of these torpedoes, and with them experiments were carried out in October of last year, to which we shall next direct attention.

"The construction of these torpedoes was carried out at Chatham by the inventor with the utmost secrecy, and the most profound mystery was made to surround them. Our acquaintance with the weapon at the port of Fiume affords us a general knowledge of its construction, whilst for the rest we may observe that its details are of no great moment save to those who have sold and those who have bought the torpedo. In the Sheerness experiments, the *Oberon* was used as a torpedo vessel, having been fitted with a tube 2 feet in diameter and 28 feet in length, placed in a line with her keel, and some distance below her draught-line. This tube was closed externally by a cap, and was divided internally into two portions, each being rendered water-tight by means of penstocks, which also prevented the admission of water into the ship. The torpedo was passed into the rear portion of the tube upon rollers, and the penstock behind it being secured, the one in front was opened. The cap was then removed from the orifice, and the weapon expelled from the tube by a piston arrangement. The fins act as guides, bearing against four rails placed at the top and bottom of the tube. As the torpedo passed out of the tube, a projecting lever caught against a stud in the latter, and started the propelling machinery. Direction was given to the weapon by the course of the vessel aim being taken by the steersman. On the occasion of the trials, the hulk of the *Aigle*, which had long been used as a coal depot in Sheerness harbor, formed the object of attack. The hulk was about 120 feet long with 30 feet beam, and was moored fast stem and stern. The *Oberon* steamed head on to the broadside of the *Aigle* until she nearly reached her, then she backed astern to a range of about 120 or 130 yards from the target. At a given signal the torpedo was liberated, and in about 25 seconds more it exploded against the hulk. The timbers of the *Aigle* were tolerably rotten, so that 67 lbs. of gun-cotton easily put an end to her existence. A smaller torpedo was subsequently discharged from a gig 20 feet long against a netting target, in which it was caught and exploded. The range was the same as in the previous experiment, and the object was to show that a vessel could be protected by such a surrounding, placed about 5 yards from her hull. This was supposed to have been demonstrated by the fact that the hulk behind the netting was not injured. The charge, however, was only 18 lb. of gly-oxaline, which is much smaller than would ever be used in practice. But what vessel on earth—we mean on water—would ever sail about with a crinoline of rope netting on?

Such are all the experiments, as far as we know, that have been made with this fancy weapon. Let us then see what they teach, and how far they justify a payment of £15,000 for the secret of the invention alone, not to mention the cost of the torpedoes, which is very great. All that we at present know is that, to use these weapons, the torpedo vessel must approach within very close range of the enemy, and must then back and fill, and be brought to a dead stand, before delivering her charge. Aim must, moreover, be taken at an enemy's broadside, and the chances of escape for the torpedo craft from the guns of her adversary are small indeed. Besides, it was a very easy matter to steer the *Oberon* direct on to the broadside of the moored and unresisting hulk of the *Aigle*, and to plant a torpedo upon her at a distance of 130 yards in the calm waters of the Medway. But what about a rough sea, a moving vessel with spiteful guns on board of her? or what of a dark night with a bit of wind on? We contend that it would be utterly impossible to deliver a fish torpedo successfully under any of the above conditions, so that we are reduced to the necessity of admiring Mr. Whitehead's skill in devising this ingenious weapon. In 1869, a Commission from the United States, consisting of Admiral Radford, and two officers from the United States frigate *Franklin* was sent to Fiume to investigate the nature and powers of the fish torpedo. But it does not appear that they were particularly smitten therewith, as they left the inventor in undisturbed possession of his secret. Austria, it is said, has paid a good round sum for the invention, but she does not seem to think very much of it, or to have utilized it, and such will doubtless be the result of our experience in the matter.

Copal.

CONTRARY to what is generally supposed, there is but very little copal found upon the Island of Zanzibar itself, and the little which is found is very inferior in quality and does not enter into trade. Moreover, there are copal-producing trees still growing on the island, and in various parts of West Africa, particularly in the interior whence the raw copal is brought by the natives, but the fresh and unfossilized gum obtained from these is nearly valueless, and when mixed with the fossil gums, as is often done by the natives for the purpose of adulteration, it is always rejected by experienced buyers.

The great bulk of the fossil copal, which alone is merchantable, comes from the adjacent shores of Africa, where it is found principally in a long strip of coast land, having an extent of two or three hundred miles in length, and extending inland to a distance of about 25 miles. This section of the East African coast land is called the Mrima, and it is in the sand of this low and desolate tract, in which there are no inhabitants, and but little vegetation, that the Zanzibar copal is found.—*The Hub.*

Sea-baths for London.

A PROJECT for supplying London with sea-water has been started by a company, which is about to apply to Parliament for incorporation, and for the necessary powers to effect its object. It is proposed to bring the water from the neighborhood of Brighton, by means of nine reservoirs and ten conduits and pumping stations, which are to be constructed *en route* at Aldrington, Preston, Patcham, Newtimber, and Cuckfield, in Sussex; Merstham Surrey; Hendon Street and Vauxhall Bridge Road, St. George's, Hanover Square, and in Moore Street, St. Luke's, Chelsea. The company propose, further, to construct public and other baths, and to supply sea-water to Brighton itself and other enumerated localities, and to any parish or place within the limits of the metropolis district, as defined by the "Metropolis Local Management Act."

From Odessa to Hong Kong.

IT is not generally known that Russia is now running a line of fine steamships from Odessa, in the Black Sea, and Hong Kong, via the Suez Canal. It is stated that the line is to be extended by connecting steamers from the mouth of the Amour, through the Yellow Sea and the Chinese coast, touching at the principal ports in China and Japan. This will probably be the longest line of unbroken ocean steam transit in the world.

American vs. English Traveling.

SAYS *Engineering*:—"The traveling public this (European) side of the Atlantic, especially the English traveling public, are very patient and long-suffering. Americans understand how to reduce the inconvenience of travel to a minimum, and to provide luxurious accommodation at a moderate cost to every traveler, whether by railway or river; fitting up cars, in the one case, with a degree of completeness and comfort unknown out of the country, and equipping floating palaces, whereof the magnificence must be seen to be believed, in the other. That railway collisions are frequent, and disastrous river-boat explosions are not unknown, does not by any means affect the matter. Comfort in traveling is an affair separate from safety; the former, as we say, is thoroughly understood in the States, the latter will probably come in time.

On the other hand, the British public, with far greater means at their disposal, and a boasted superiority in matters of taste and refinement, are content to submit to many easily obviated railway discomforts; have only lately, and under protest, admitted improvements in passenger street-traffic; continue to support a service of river-boats which are a disgrace to the Thames, and to every one who has to do with them; and, year after year, passes in idle discussion upon improvements in our international communication, while nothing is done, and the many thousands of Channel passengers remain subjected to all the inconveniences of a service against which for years past the whole civilized world has cried out.

Novel Camp Bed.

INDIA-RUBBER has been applied in the manufacture of beds, mattresses, and the like in many different ways. A new application in this line comprises the use of a sheet of india-rubber cloth, six feet square, divided into three portions, the center being double, so that it may be inflated with air or water, and one end raised in the form of a pillow. The two wings are of single cloth with buttons and buttonholes, so that they may lap over, and kept extended and raised by bars, so that they form a kind of tent or pitched roof. The sheet is fitted with eyelet holes, straps or cords, and a flap or hood-piece. In connection with each bed is a pole, for convenience divided into four lengths. The bed can be arranged to act as a tent, as a sentry box and a cloak, and as a pontoon.

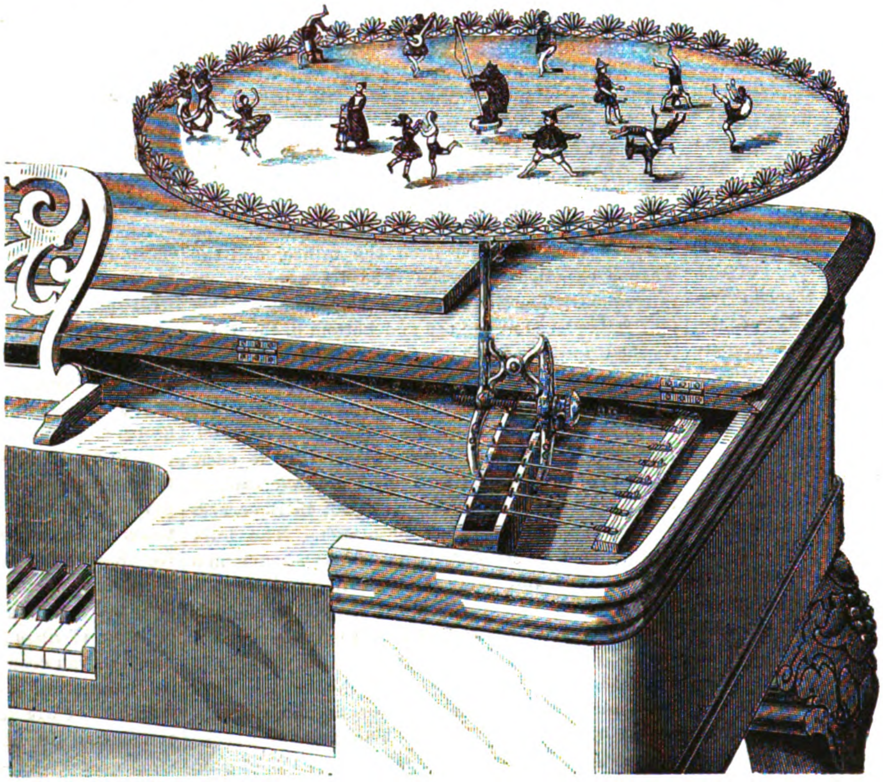
THE Ames Company at Chicopee are now constructing three bronze light-house domes for the Pacific coast. They will be put up in numbered sections, extending through the three stories of the building, and when properly fitted taken down and shipped.

WEST VIRGINIA embraces 16,000 of the 55,000 square miles of the great Alleghany coal-basin—the largest and among the richest known to exist in the world.

Wild's Patent Dancing Toy.

FOR innocent fun, a very excellent thing in its way, the little invention represented in the accompanying engraving can justly lay claim to much merit. As will be seen from the appended description, it comprises a circular table so attached to the bridge of a piano-forte that the vibrations induced in the playing of the instrument insure the most grotesque saltatory exercises on the part of certain miniature figures arranged upon the table; the movement of the figures keeping perfect time to the music, and performing in a truly comical manner.

In adjusting the toy in position the upright standard upon the upper end of which the table, or, so to speak, the dancing floor, is fixed, has its lower extremity provided with a screw-clamp, clearly represented in the engraving. This clamp is attached to the base end of the sounding-board bridge, *i.e.*, the wooden bar or strip over which the piano strings are passed, and strained tight by means of the pegs. By very simple means, not shown in the engraving, the retention of the dancing figures in proper position upon the table is secured. The operation of the device is readily apparent; the vibrations from the strings passing through the bridge to the upright standard, and being thence communicated to the table, the jarring or trembling of which in regular time gives motion to the figures. Different figures, of which a large variety is provided, may be used as desired, and the entertainment varied accordingly. The toy is very neatly got up, with a gilt ornamental rim around the periphery of the table, and, with the directions just given, may be readily applied to a piano. Of course in overstrung pianos, in which the bridge is comprised in several pieces, the clamp may be attached to any one of them. But should these not extend beyond the top of the piano, the top must either be raised or the device be attached to the main bridge. It should be mentioned that, while the screw-clamp is preferred for the more finished styles of the toy, a spring-clamp is made to serve the same purpose in the cheaper varieties. This amusing toy was patented Nov. 29, 1870, and any further information may be obtained by addressing G. L. Wild & Bros., No. 420 Eleventh Street, Washington, D. C.



WILD'S PATENT DANCING TOY.

Improvements in Gas Manufacture.

GAS engineering is now recognized as a distinct and important branch of the constructive arts, and shows continual proof of progress in the improvements that are being constantly wrought therein. Among the latest of these we clip from an exchange mention of a new arrangement of retorts for which some practical advantages are claimed. In it a bench of three retorts is used—one set horizontally, and the other two set vertically. The two vertical retorts are filled with small pieces of fire-brick kept at a white heat. The crude fuel is placed in the receiving retort, and the volatile products conveyed directly to the vertical retorts.

Another system of improvements in this line of recent English origin is set forth as consisting in—1. Furnaces or ovens built of porous bricks, made of fire-clay mixed with plumbago, asbestus, or pumice, and have flues to keep the materials cool; they are suitable for heating retorts and for smelting purposes. 2. The doors of gas-retorts are formed with a ring of iron with snugs and a disk of sheet-iron operated on by screws, or with a hinged cross-bar, making a secure joint without luting. 3. Liquid is distributed to the scrubber by a divided hollow arm, overbalanced by water, and traveling round upon a wheel having short, flat faces. 4. The hydraulic center valve is connected with a series of four purifiers by a four-way cock or valve. 5. To prevent offensive gases being given off, the spent lime is damped, pressed, and formed into solid blocks with other materials or alone. The mixing and pressing machine consists of a mill having horizontal revolving arms with an eccentric serrated ring.

OUT of the three hundred and seven million passengers carried last year on the English railways, only seventeen were killed by "causes beyond their own control." This is less than half the number killed during the same period by orange-peel thrown on the London pavements, which would seem to prove that it is just twice as safe to ride on English railroads as it is to walk on the London streets.

ALLIGATOR-HIDE boots are much believed in, and cost more money than can be cheerfully paid by any person unless he has cash in plenty and a passion for keeping his feet dry; yet ordinary leather is now stamped to resemble alligator-skin. So an indignant gentleman writes to a newspaper that *genuine* mattress curled hair is now made from whalebone finely shaved. What a shoddy world is this we live in!

NEW PUBLICATIONS.

THE HISTORY OF THE FIRST LOCOMOTIVES IN AMERICA. From original documents and the testimony of living witnesses. By William H. Brown.

This volume belongs to a class which has too few representatives in our technical literature: those which gather up from threatened oblivion the records of what was done in the infancy of American industrial and engineering enterprise, and provide in permanent form the material from which the historian in aftertimes will cull his choicest data. Without pretending to any especial grace in style or system in treatment of his subject, the writer of the volume before us has traced in a most satisfactory manner the history of the locomotive as concerns its introduction and use in this country, and his book should find a place on the library shelves of all who take an interest either in the practical working and management of railways, or of those who delight in studying the development of the industrial agencies to which all lands, and our own in particular, owe so much of their progress in all that pertains to civilized life.

The first running locomotive of which we have any account was that of Cugnot, in 1769, built at the expense of the King of France, and still to be seen in the museum of the "Conservatoire des Arts and Metiers," at Paris. It was driven by two cylinders acting through piston-rods, etc., direct on the forward wheels, and supplied with steam from a kettle-shaped boiler carried at the front of the machine, and it ran at the rate of four miles an hour. In 1784, William Murdoch, in England, made a successful model of a steam-propelled carriage, and was followed two years later by William Symington, who also made a model, but neither of these projectors proceeded any further with the work. In 1801, Oliver Evans built a floating dredging machine weighing 42,000 pounds, to the hull or vessel of which he fitted wheels connected with the engine, and ran it on land a mile and a half to the place of launching. In 1804, Trevethick placed a locomotive on the Merthyr Tydvil Tramway, in South Wales. It drew ten tuns at five miles an hour, and had a cylindrical boiler of cast-iron. This was the first instance in which the locomotive was placed upon rails; in other words, it formed the first railway as we now understand the term.

But, although at first apparently successful, the many defects in the details of construction soon led to its abandonment, and various and odd were the devices brought forward to fulfil the supposed requisites of a profitable railway. Among these was the plan of Blenkinsop, put in operation between the town of Leeds (England), and the Middletown Collieries, three and one-half miles distant, in 1812, and actually the first commercial railway in existence. In this the supporting wheels were wholly independent of the engine, which latter worked a toothed wheel gearing into a toothed rail alongside the track. For a number of years the engines on this line drew trains carrying thirty tuns, at about three and three-fourths miles per hour. Another plan was that of a chain laid between the tracks, and passing once around a rotating barrel on the locomotive, so that the latter could pull itself along by a strain upon the chain. Still another was Brunton's engine, which was calculated to work by being pushed along by legs acting on the ground behind. The first experimental engine on this system blew up and killed and wounded several persons, and that was the last of it. In 1812, Mr. Blackett, of Wylam, made a series of experiments that proved the adhesion of locomotive wheels on smooth rails to be sufficient for all tractive purposes; this of course put Blenkinsop's method out of sight, and paved the way for Stephenson's success with his first engine, tried on the Killingwood Railway, July 25, 1814, and drew thirty tuns up a grade of one in four hundred and fifty, at a speed of four miles an hour. After this came the rapid succession of locomotives which established the railway, as the term is now understood, in England, and led to its introduction in America.

The first locomotive run on rails in the United States (or on the continent) was the *Stourbridge Lion*, made by Stephenson, and brought from England for the Delaware and Hudson Canal and Railroad Company, by Horatio Allen, who still tells with much worthy pride of his running it, single-handed, for the first time. The best available memoranda that the years have spared fixes the date on the 8th of August, 1829. The same year marked the fabrication of locomotives at home. This resulted from an absolute necessity. The English engines were made for straight lines, or those with only gentle curves, whereas the exigencies of American railway engineering required the turning of sharp curves, sometimes with a radius of not more than two hundred feet. The success of the Baltimore and Ohio road depended upon the turning of curves, to which the imported locomotives were unequal, and Mr. Peter Cooper, since so widely known for his philanthropy, devised the engine which solved the difficulty. This was in 1829. It drew its own fuel and water, with cars, and forty persons, and made thirteen miles up a grade of eighteen feet to the mile in one hour and twelve minutes. The return trip occupied twelve minutes. The second locomotive built in the United States for actual service on a railway was the *West Point*, built at the West Point Foundry Works, in New York City, for the South Carolina Railroad, and, after some experimental running, made its first regular trip March 5, 1831.

So much for the topic indicated on the title-page of the book before us, and to which we do but inadequate justice in this brief review. The writer has sought to verify his statements by original documents, which are frequently quoted entire, and help to make the book full of quaint, out-of-the-way, and interesting information. It may be obtained from the author at 31 Beekman Street, New York City.

A PRACTICAL GUIDE TO THE MANUFACTURE OF METALLIC ALLOYS. Comprising their chemical and physical properties, with their composition and uses. Translated from the French, by A. Guettier, Engineer and Director of Foundries, author of "La Fonderie en France," etc. By A. Fesquet, Chemist and Engineer. Philadelphia: Henry Carey Baird, Industrial Publisher, 406 Walnut Street. 1872. Price $3 00.

The character of this work is fully indicated by the title-page. It is carefully compiled, and will be found useful as a work of reference to the practical man, and a source of much interesting information to the student of metallurgy.

THE Bridgewater, Mass., forge has contracted with the Pacific Mail Steamship Company to furnish a new shaft for the steamer *China*, to weigh 38 tuns, and one for the steamer *Japan*, to weigh 45 tuns, the latter being the largest forging of its kind in the world. It is to be of the best fagoted charcoal iron, to stand the test of 70,000 pounds to the square inch. These shafts will be shipped to China as spare ones.

The Austrian World's Fair.

AMERICANS should remember that Vienna is to have a world's fair in 1873. At the Paris exhibition of 1867 nearly everything sent from this country took a prize, and there is no reason why the same thing should not be repeated at Vienna in 1873. The exhibition will undoubtedly be the largest that has ever yet been seen. The park set apart for the exhibition contains four times as many square yards as have ever been similarly occupied, and the principal building alone will have a length of four thousand six hundred and fifty feet. The committee having the matter in charge wish to have a full display of the raw materials and manufactured articles of each nation, with statistical information in reference to the amount produced and the trade therein. Special efforts will be made to have the art collections as complete as possible, and it is proposed to have a loan collection from all the German museums, similar to the celebrated one at Kensington. Another specialty will be a collection of articles used by different nations in their domestic affairs—kitchen utensils, furniture, dress, ornamental objects, in fact everything used about a house. As the Austrian nation has never had an exhibition of this character, they will, undoubtedly, work hard to make it a success. The opportunity ought not to be neglected by the manufacturers of this country.

THE Madgeburg *Gazette* furnishes some interesting statistics regarding the present annual manufacture of arms in the various European states. The English Government has made contracts for the delivery of at least 100,000 Martini-Henry rifles per annum; the French purchases amount to three times that number of Chassepôts. Russia manufactures from 150,000 to 180,000 Berdan rifles at home, and has made contracts for foreign deliveries of 24,000. Austria has raised its home manufacture of Werndl rifles to 120,000 in the year. Bavaria produces between 30,000 and 40,000, and North Germany, strange to say, is limited to the same moderate rate of manufacture. As that is, however, entirely inadequate to the requirements of the army—especially since it is proposed to rearm the infantry with a new kind of rifle, and since it seems doubtful whether the captured Chassepôts will be put to immediate use for the army—provision is being made for the material enlargement of the North German gun factories.

COMBINED TIN AND LEAD PIPE.—Tin-lined lead pipe has been in use for a long time, and now an English inventor proposes to make it with a tin covering. The object is to produce pipes composed of a thickness of tin internally and externally, and a thickness of lead between, and to do so in such manner that the thickness of tin will be uniform and sufficient to ensure durability, the union of the metals perfect, and the surfaces smooth. The inventor casts or otherwise forms ingots each of three thicknesses of metal; first an internal one of tin, second of lead, and third one of tin, and manufactures pipes from such novel combination ingots by forcing the metal, while over a core, out of a cylinder, through a die, by hydraulic pressure.

CONCERNING the late storm on the Kansas Pacific, a Kansas paper says that the telegraph poles were blown across the track for miles, the wires becoming entangled with the engine and wheels of the train, and the engineer and fireman were driven from their posts. Whole herds of buffalo crowded around the cars seeking shelter from the storm.

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AND EACH BEARING THAT DATE.

[Reported officially for the "American Artisan."]

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122,096.—MUSICAL NOTATION.—Fielding Wallace Acee, Columbus, Ga.

122,097.—FIRE-PLUG AND HYDRANT.—Albert Francis Allen, Providence, R. I.

122,098.—PERFORATING MACHINE.—Frank Anderson, Peekskill, N. Y.

122,099.—PAPER-BAG MACHINE.—James Arkell, assignor to Arkell & Smiths, Canajoharie, N. Y.

122,100.—PREPARING SALT.—Francis Baker, Boston, Mass.

122,101.—APPARATUS FOR PREPARING SALT FOR CULINARY USE.—Francis Baker, Boston, Mass. Ante-dated Dec. 23, 1871.

122,102.—MACHINE FOR MAKING SHOT.—William W. Brigg, Home, Tenn. Ante-dated Dec. 6, 1871.

122,103.—EARTH-CLOSET.—Henry C. Bull, assignor to Joseph M. Loewenstein, New Orleans, La.

122,104.—STOCK AND FREIGHT CAR.—James B. Calkins, Pacific assignor to himself and Josiah Geiger, St. Louis, Mo.

122,105.—DRAUGHT-REGULATOR FOR FURNACES AND STOVES.—Ferdinand E. Chatard, Jun., Baltimore, Md.

122,106.—BOX-OPENER.—Richard H. Chinn, Washington, D. C., George Hall and Jesse J. Fitch, Morgantown, West Va.

122,107.—TREADLE FOR SEWING-MACHINES.—Henry A. Clark, Boston, Mass. Ante-dated Dec. 6, 1871.

122,108.—WRENCH.—Aury G. Coes, Worcester, Mass.

122,109.—HORSE HAY-RAKE.—James Comly, York, Pa.

122,110.—MARINE PAINT.—John J. Currier and Leonard Cook, Gloucester, Mass.

122,111.—SPRING FOR UPHOLSTERY PURPOSES.—James F. Duffy, assignor to himself and George C. Tobius, Chicago, Ill. Ante-dated Dec. 9, 1871.

122,112.—HEEL FOR BOOTS AND SHOES.—Charles H. Eggleston, Marshall, Mich.

122,113.—SEWING-MACHINE.—John Fanning and Edward Nugent, Brooklyn, assignors to John C. Adams and John H. Andrus, Buffalo, N. Y.

122,114.—THROAT-CHECK FOR HORSES.—Samuel French, assignor to himself and James H. Page, Boston, Mass.

122,115.—APPARATUS FOR RECTIFYING SPIRITS, ETC.—John Godfrey Guenther, Buffalo, N. Y.

122,116.—SAW-COLLAR.—Frank A. Huntington, San Francisco, Cal.

122,117.—SHINGLE MACHINE.—Frank A. Huntington, San Francisco, Cal.

122,118.—ROTARY BLOWER.—William G. Hyndman, Cincinnati, Ohio.

122,119.—CALF-WEANER.—Thomas A. R. Keech, Bladensburg, Md. Ante-dated Dec. 15, 1871.

122,120.—STOCK-CAR.—Thomas E. Knauss, Zaleski, Ohio.

122,121.—HAND-PLANTER.—John H. Latimer, Crystal Lake, Ill.

122,122.—TOY-GUN.—Adam I. Lenhart, assignor of one-half his right to Warren K. Lyons; and said Lyons assignor to Daniel B. Felter, New Brunswick, N. J.

122,123.—EARTH-CLOSET.—Joseph M. Loewenstein, New Orleans, La.

122,124.—COMBINATION LOCK.—Franklin Peter Marsden, Galena, Ill.

122,125.—GATE.—Mark Martin, Rockford, Ill.

122,126.—STOVE-LEG.—James T. Milligan, Du Quoin, Ill., assignor to himself and Joseph W. Branch, St. Louis, Mo. Ante-dated Dec. 20, 1871.

122,127.—SNAP-HOOK.—Lewis Morse, Attleborough, Mass.

122,128.—MACHINE FOR PITCHING BARRELS.—Daniel Myers, Baltimore, Md.

122,129.—FEED-MILL.—John W. Myers, Lyons City, Iowa.

122,130.—MACHINE FOR REMOVING GREASE FROM LEATHER.—James Perkins, Peabody, and George L. Newcomb, Salem, Mass.

122,131.—TIN-LINED IRON PIPE.—Clark M. Platt, Waterbury, Conn.

122,132.—SOLDERING APPARATUS.—David Porteous, Baltimore, Md.

122,133.—BARREL.—Henry G. Porter, Grand Rapids, Mich.

122,134.—DRAWING-TABLE.—Joseph L. Ross, Boston, and Frederick C. Hanson, Charlestown, Mass.

122,135.—FASTENER FOR BAGS, ETC.—George C. Setchell and Cebra L. Taylor, assignors to themselves and Chester W. Converse, Norwich, Conn.

122,136.—MACHINE FOR DICING LEATHER.—Alfred Shedlock, New York, assignor of one-half his right to Claudius F. Beatty, Brooklyn, N. Y.

122,137.—MACHINE FOR PLAITING CLOTH.—William Mont Storm, New York City.

122,138.—MUSICAL CAGE FOR ANIMALS.—Antonio Suppernip, Milburn, N. J.

122,139.—WRENCH.—George C. Taft, assignor to John H. Coes, Worcester, Mass.

122,140.—SAFETY-CLASP FOR POCKETS.—Daniel C. Tuck, Farmington, Me.

122,141.—ELASTIC WASHER.—John P. Verree, Philadelphia, Pa.

122,142.—PROCESS OF TREATING RAWHIDE.—Benjamin F. Wright, Winchester, assignor to Charles H. Drew, Brookline, and Francis T. Morton, Boston, Mass.

122,143.—FRUIT-JAR.—Hassan U. Allen, North Bennington, Vt. Ante-dated Dec. 22, 1871.

122,144.—SAW-FILER'S VISE.—Nathan H. Baldwin, Laconia, N. H.

122,145.—APPARATUS FOR PRODUCING PLANE OR PARALLEL MOVEMENT.—Albert G. Barrett, Barrett, Kan.

122,146.—THILL COUPLING.—Lester D. Belnap, assignor of one-half his right to George W. Bullock, Jonesville, Mich.

122,147.—COMBINED COAL-HOD AND SIFTER.—Ralph Bogle, Milton, Pa.

122,148.—GRAIN AND SEED SEPARATOR.—John Boozer, Potter's Mills, Pa.

122,149.—SPRING-BIT FOR CLEANING AND ENLARGING WELLS.—James H. Boyd, West Monterey, Pa.

122,150.—WASHING MACHINE.—Thomas M. Brintnall, Medina, Ohio, and William Eugene Powers, Cortland, N. Y.

122,151.—WINDLASS.—Edgar Buell, Clinton, Conn.

122,152.—SUPPORTING-BUSK FOR CORSET-FASTENINGS.—Mellissa E. Bulkley, Providence, R. I.

122,153.—HAIR-SWITCH.—Benjamin Franklin Burgess, Jun., Boston, Mass.

122,154.—BLIND-STOP.—Perry A. Burgess, Butler, Mo.

122,155.—PLOW-CLEANER.—George W. Burr, East Line, N. Y.

122,156.—BASE-BURNING COOKING-STOVE.—William Clark, Shelburne, Vt.

122,157.—TANNING-VAT.—Joseph W. Coburn, East Walpole, Mass.

122,158.—PICTURE-FRAME, ETC.—George E. Collins and Willard C. Collins, Bucksport, Maine. Ante-dated Dec. 21, 1871.

122,159.—AUTOMATIC OILER FOR LOOMS.—Joseph Crook, Ludlow, Vt.

122,160.—HEATING-STOVE.—Mark A. Cushing, Aurora, Ill.

122,161.—CIRCULAR-SAW MILL.—Melancton W. Danks, assignor to himself and J. E. Harroun, Fulton, N. Y.

122,162.—PLOW.—William H. H. Doty, Sonora, Ohio.

122,163.—MODE OF COVERING HARNESS MOUNTINGS.—William Fawcett, New York City.

122,164.—CLOTHES-WRINGER.—John Fox, Farmersville, Iowa.

122,165.—HEAD-REST FOR CAR-SEATS.—John C. Giffing, New York City.

122,166.—BUTTER-TUB.—James Gilberds, Jamestown, N. Y.

122,167.—BILLIARD-REGISTER.—Leon Godefroy, Pulaski, Tenn.

122,168.—FOLDING HAT-RACK.—Nathan Hayden, Chicago, Ill. Ante-dated Dec. 9, 1871.

122,169.—PEN-AND-PENCIL CASE.—William S. Hicks, New York City.

122,170.—PROCESS OF PRINTING ON ENAMELED OR VITREOUS SURFACES.—Samuel J. Hogeson, assignor to himself, William A. Peck, Jun., and Whiting S. Sanford, New Haven, Conn.

122,171.—METALLIC LATHING.—Isaac V. Holmes, New York City.—Ante-dated Dec. 9, 1871.

122,172.—HOMINY MILL.—Theodore Hudnut, Terre Haute, Ind.

122,173.—TREATMENT OF PEAT FOR FUEL.—Edwin James Hulbert and Aimé-Nicholas Napoleon Aubin, Portland, Conn.

122,174.—LIQUID METER.—David W. Huntington and William A. Hempstead, South Coventry, Conn.

122,175.—CAR-COUPLING.—Frederick A. Illingworth, Waltham, Mass.

122,176.—CORN HARVESTER.—John Johnson, Mott Haven, N. Y.

122,177.—APPARATUS FOR CLOSING BARRELS AND CASKS.—Adolph Koegler, Newark, N. J.

122,178.—DEVICE FOR SUPPORTING DRAWERS.—Charles F. Langford, Brooklyn, N. Y.

122,179.—FOLDING BUREAU.—John E. Lawrence and John S. Young, Philadelphia, Pa.

122,180.—HEMMER FOR SEWING-MACHINES.—Stephen B. Lawrence, Scarsdale, N. Y.

122,181.—MACHINE AND PROCESS FOR MANUFACTURE OF PEAT FUEL.—Thomas H. Leavitt, Boston, Mass. Ante-dated Dec. 20, 1871.

122,182.—RETRACTOR FOR REVOLVING FIREARMS.—Thomas Lee, Westport, Conn.

122,183.—DETACHABLE HAIR-CURL, AND APPARATUS FOR MANUFACTURING THE SAME.—John Mayer, Philadelphia, Pa.

122,184.—KNEADING MACHINE.—Edward McAllister, Rochester, N. Y.

122,185.—COMBINED AXLE-BOX, SAND-BAND, AND CASING FOR CARRIAGE-WHEEL HUBS.—Michael McNalley, Houston, Tex.

122,186.—BRUSH.—James Michales, Jun., and Richard Jaques Combs, Bergen, N. J. Ante-dated Dec. 23, 1871.

122,187.—GUN-BARREL.—Renselaer R. Moore, Cortland, N. Y.

122,188.—RELEASING DEVICE FOR STABLES.—Edmund B. Myers, York, Pa.

122,189.—CAR-COUPLING.—Franklin Nalley, Battle Ground, Ind.

122,190.—TUYERE.—Stephen Parsons, St. Francisville, Mo.

122,191.—CORN-PLANTER.—Joseph Pies, Sparland, Ill.

122,192.—JEWELRY-FASTENING.—Robert James Pond, assignor to Hodenpyl, Tunison & Co., New York City.

122,193.—TOY-PISTOL.—Henry M. Quackenbush, Herkimer, N. Y.

122,194.—APPARATUS FOR EVAPORATING SUGAR, ETC.—Peter Robinson, Harrisburg, Ill.

122,195.—LIQUID-MEASURING APPARATUS.—Johann Schmidt, Vienna, Austria, assignor to Samuel Hirschl, Davenport, Iowa.

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122,197.—COTTON-PRESS.—Thomas D. Simpson and William S. Lamkin, Marshall, Tex.

122,198.—ADJUSTABLE CUT-OFF VALVE.—George W. Smith, New Haven, Conn.

122,199.—CLOTHES-PIN.—Lewis Sprague and Charles H. Sprague, Henderson, N. Y. Ante-dated December 16, 1871.

122,200.—HOUSE-BELL.—Amos L. Swan, Cherry Valley, N. Y.

122,201.—HARVESTER.—John B. Thomson, Lynchburg, Tenn.

122,202.—RAILWAY SIGNAL.—Charles D. Tisdale, assignor to himself and Samuel Snackell, Boston, Mass.

122,203.—SHOE-FASTENING.—Samuel P. R. Triscott and George Alfred Wheeler, Worcester, Mass.

122,204.—FEED-WATER HEATER.—William E. Walsh, Jersey City, N. J.

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122,209.—SEWER-TRAP AND CATCH-BASIN.—Alfred B. Ashman and Alfred H. Newell, Cincinnati, Ohio.

122,210.—THRESHOLD.—Elias Baker, assignor to George A. Colby, Meriden, N. H.

122,211.—FILLER-BOX FOR CIGAR-MAKERS.—George Barry, Chicago, Ill.

122,212.—ENVELOPE.—Samuel D. Bates, Boston, Mass.

122,213.—THILL-COUPLING.—Edward Batwell, Ypsilanti, Mich.

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122,216.—BRONZING MACHINE.—Edward F. Benton, Buffalo, N. Y.

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122,220.—CLOTHES-WRINGER.—Jacob Brinkerhoff, Auburn, N. Y.

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122,222.—MACHINE FOR TURNING STONE.—John Dickinson Brunton, Leighton Crescent, Kentish Town, England.

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122,224.—STEAM-ENGINE.—Leander Carman, McCoy's Station, Ohio.

122,225.—KITCHEN-TABLE.—Henry Closterman, Jun., Cincinnati, Ohio.

122,226.—DUMPING-CAR.—Franklin B. Colton, Philadelphia, Pa.

122,227.—DUMPING-BUCKET.—Franklin B. Colton, Philadelphia, Pa.

122,228.—HEAD-BLOCK.—John M. Comins, assignor to himself and Austin G. Kimball, Boscawen, N. H.

122,229.—TURN-TABLE.—William S. Coulter, Ashley, Pa.

122,230.—HOLLOW BEAM.—Joseph W. Cremin, New York City, assignor of one-half his right to George H. Fairchild, Jersey City, N. J.

122,231.—LIQUID METER.—Joseph W. Cremin, New York City, assignor of one-half his right to George H. Fairchild, Jersey City, N. J.

122,232.—CHEESE-VAT.—Francis E. Day, Kennedy, N. Y.

122,233.—OPERATING RAILWAY SWITCH.—Arthur C. Devlan, Altoona, Pa.

122,234.—STONE-SAWING MACHINE.—Jacob Dindinger and Christian Henri, New Orleans, La.

122,235.—MODE OF COUPLING CARRIAGES.—William T. Dole, Peabody, Mass.

122,236.—THREAD-MEASURING APPARATUS.—Leonard F. Dunn, Oneida Community, Oneida, N. Y.

122,237.—STUMP-EXTRACTOR.—George E. Dyer, New Sharon, Maine.

122,238.—LADDER.—Frederick Eells, Walton, N. Y.

122,239.—WINDOW CASING AND SASH.—Marshall M. Ellis, assignor to himself and Frederick R. Ladd, Springfield, Mass.

122,240.—CULTIVATOR.—David Zimmerman Evans, Town Point, Md.

122,241.—NEEDLE-THREADER AND SPOOL COMBINED.—George P. Farmer, Brooklyn, N. Y.

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122,243.—BORING-BAR FOR FACING THE ENDS OF CYLINDERS.—James Flower, Detroit, Mich.

122,244.—FIRE-EXTINGUISHER.—Joseph Gardner, Louisville, Ky.

122,245.—EXPLOSIVE COMPOUND.—Edwin Gomez, New York City. Ante-dated Dec. 20, 1871.

122,246.—MACHINE FOR WRAPPING WIRE CABLES.—John Gray, Cincinnati, Ohio.

122,247.—MACHINE FOR LAYING BRIDGE CABLES.—John Gray, Cincinnati, Ohio.

122,248.—STEAM ENGINE.—Darwin A. Greene, New York City.

122,249.—INCUBATOR.—Henry J. Haight, New York City.

122,250.—COVER FOR GAS-RETORTS.—Alonzo F. Havens, Brooklyn, N. Y.

122,251.—REVOLVING HARROW.—Jacob Hill and James G. Stewart, Jonesville, Ind.

122,252.—STEAM-BOILER TUBE-BUSHING.—Francis R. Hulbert, Grand Rapids, Mich.

122,253.—TABLE FOR EMERY-GRINDERS.—James L. Jackson, New York City.

122,254.—DENTAL FORCEPS.—Peter N. Jacobus, Montague, N. J.

122,255.—MAKING STEEL CASTINGS.—William Kelly, Louisville, Ky.

122,256.—PRESSER-FOOT LIFTER FOR SEWING-MACHINES.—Theodore W. Kennedy, New York City.

122,257.—MECHANISM FOR A REED-ORGAN SWELL.—Michael J. Kerigan, Boston, Mass.

122,258.—PRESERVING EGGS.—John Knapp, Prattsburg, N. Y.

122,259.—SCREW-PRESS.—Lucius J. Knowles, Worcester, Mass.

122,260.—METHOD OF CUTTING CLOTH.—Eliza J. Lake, Washington, D. C.

122,261.—PLOW.—Daniel Martin Lamb, Strathroy, Canada, assignor to himself and Van Ransselaer Warren, Somerville, Mass.

122,262.—RULING MACHINE.—Dorus W. Landvoigt, Washington, D. C.

122,263.—HEAD-BLOCK FOR SAW-MILLS.—Dennis Lane, Montpelier, Vt.

122,264.—RAILWAY CAR-BRAKE.—Chancy H. Lathrop, Jersey City, N. J.

122,265.—COPYING PRESS.—Arthur Le Clercq, New York City.

122,266.—ELECTRO-MAGNETIC APPARATUS.—George Little, Rutherford Park, N. J.

122,267.—RHEOSTAT OR RESISTANCE-COIL.—George Little, Rutherford Park, N. J.

122,268.—MECHANISM FOR OPERATING ATTACHMENTS IN SEWING-MACHINES.—Joseph W. Lyon, Chicago, Ill.

122,269.—VALVE-GEAR FOR STEAM-ENGINES.—John C. McDonald, St. Louis, Mo.

122,270.—SHEARS FOR CUTTING METAL.—George M. Marshall, New Haven, Wis. Ante-dated Dec. 23, 1871.

122,271.—RAILWAY-SWITCH.—William L. Martin, Rienzi, Miss.

122,272.—STEAM-TRAP.—Hiram S. Maxim, Brooklyn, N. Y.

122,273.—DEODORIZING THE GASES FROM LARD-BOILING, ETC.—William H. McNeill, West Orange, N. J.

122,274.—BELT-PUMP.—Samuel C. Murdoch and Thomas H. Borland, Pittsburg, Pa.

122,275.—TURBINE WATER-WHEEL.—Matthew W. Obenchain and John T. Obenchain, Logansport, Ind.

122,276.—TOBACCO AND OTHER PRESSES.—Nathaniel M. Pepper, Danbury, N. C. Ante-dated Dec. 14, 1871.

122,277.—JOURNAL BEARING AND LUBRICATING DEVICE.—Dabney N. M. Peregoy, Johnson City, assignor to himself, Robert I. Lusk, and Lorenzo D. Poteet, Elizabethtown, Tenn.

122,278.—SLIDE FOR EXTENSION TABLES.—James Pleukharp, Columbus, Ohio.

122,279.—BEE-HIVE.—James S. Proctor, Franklin, Ky.

122,280.—CLOTHES-DRIER.—Zenas B. Putnam and Henry H. McDonald, Belfast, Me.

122,281.—COMPOSITION FOR LIQUID SOAP.—James M. Rall, assignor to William W. Thomas, St. Louis, Mo.

122,282.—HORSE HAY-RAKE.—Samuel Rockafellow, Moline, Ill.

122,283.—MACHINE FOR TENTERING CLOTH.—George S. Rogers, Thetford, Vt.

122,284.—FURROWING-PLOW.—Abraham P. Rohrer, Christian F. Rohrer, and John H. Blose, Clarke county, Ohio.

122,285.—MACHINE FOR UNTWISTING AND PICKING HAIR ROPES. Gelston Sanford, Bergen Point, N. J.

122,286.—COMBINED BAND-PUNCH AND SCREW-DRIVER.—George W. Schofield, United States Army.

122,287.—SHOE-FASTENING.—John Slatcher, Bridgeport, Conn.

122,288.—SASH-BALANCE.—Hiram Smith, Titusville, Pa.

122,289.—DISINTEGRATING WASTE VULCANIZED RUBBER.—Jacob H Smyser, Pittsburg, Pa.

122,290.—LIGHTNING-ROD.—Charles P. Snow, Freeport, Ill. Ante-dated Dec. 23, 1871.

122,291.—FILTER.—Horatio N. Taft, Sag Harbor, N. Y.

122,292.—WATCHMAN'S TIME-CHECK.—Louis A. G. Vielle and Jean La. Robellaz, New Albany, Ind.

122,293.—HEATING-STOVE.—James Wager, Troy, N. Y.

122,294.—CURTAIN-FIXTURE.—Thomas N. Webb, Baltimore, Md.

122,295.—APPARATUS FOR SETTING BOXES IN CARRIAGE-HUBS. Charles Weidig, New Haven, Conn. Ante-dated Dec. 12, 1871.

122,296.—COMPOSITION ROOF.—Edward Westermayr, Chicago, Ill.

122,297.—CARPET-BEATER.—John W. Wheeler and William A. Wheeler, Cleveland, Ohio.

122,298.—MACHINE FOR FILLING FRUIT-CANS AND FOR CLEANING OFF THE TOPS OF THE SAME.—Loren J. Wicks, Bridgeton, N. J., assignor to himself, William Selser, C. N. Selser, J. A. Selser, and G. W. Turner, Philadelphia, Pa., and John H. Poole, Bridgeton, N. J.

122,299.—GRAIN-DRILL.—Lyman Wight and Orison G. Ewings, Whitewater, Wis.

122,300.—SEEDING MACHINE.—Lyman Wight, Whitewater, and Orison G. Ewings, La Grange, Wis.

122,301.—PROPELLING VESSELS.—Matthew K. Wildman, Brooklyn, N. Y.

122,302.—BEE-HIVE.—Alonzo E. Woodhull, Spencer, Mich.

122,303.—THRASHING MACHINE.—Gustavus H. Zschech, Indianapolis, Ind.

RE-ISSUES.

4,630.—ROLLER AND FASTENING FOR CLOTHES-WRINGERS.—Robert B. Hugunin, Cleveland, Ohio, assignor to Albert H. Spencer, Providence, R. I. Patent No. 53,001, dated March 6, 1866.

4,631.—THILL-COUPLING.—Daniel A. Johnson, Boston, Mass. Patent No. 113,525, dated April 11, 1871.

4,632.—PUMP-ROD ATTACHMENT.—Henry H. Locke, Pleasantville, Pa., assignor to Douglas Bly, Rochester, N. Y. Patent No. 103,632, dated May 31, 1870.

4,633.—METHOD OF COOLING AND VENTILATING ROOMS.—Azel S. Lyman, New York City. Patent No. 14,510, dated March 25, 1856; extended seven years.

4,634.—COPPER ALLOY FOR PLOW MOLD-BOARDS, AND FOR OTHER PURPOSES.—William Magee, Jamaica, N. Y. Patent No. 119,091, dated Sept. 19, 1871.

4,635.—EXPANDING PULLEY.—Thomas H. Savery, Wilmington, Del. Patent No. 78,763, dated June 9, 1868.

4,636.—MANUFACTURE OF GUN-BARRELS.—James Henry Burton, assignor to James T. Ames, Leeds, England. Patent No. 27,539, dated March 20, 1860; ante-dated Sept. 29, 1859.

DESIGNS.

5,447.—CENTER-PIECE.—Henry Berger, New York City.

5,448.—COOKING-RANGE.—Luther W. Harwood, assignor to Fuller, Warren & Co., Troy, N. Y.

5,449.—HAND-STAMP.—Benjamin B. Hill, Springfield, Mass.

5,450.—TYPE.—Andrew Little, New York City.

5,451.—COOKING-RANGE.—Samuel P. Robinson, assignor to Robinson & Fowler Foundry Company, Plainfield, Conn.

TRADE-MARKS.

600.—BOOTS AND SHOES.—John W. Adams, Indianapolis, Ind.

601 and 602.—WHISKY.—A. W. Balch & Co., New York City.

603 to 606.—SPICES, GROCERIES, AND DRUGS.—E. R. Durkee & Co., New York City.

607.—TOBACCO.—Goodwin & Co., New York City.

THE Sacramento *Union* says that no less than 3,000 sacks of peanuts from the Upper Sacramento were shipped to the bay by steamer in two days.

ENGLISH PATENT JOURNAL.

LIST OF APPLICATIONS FOR PATENTS
ON WHICH
Provisional Protections
HAVE BEEN OBTAINED IN ENGLAND BY OR FOR AMERICAN INVENTORS.

[*This list is condensed weekly from the "Journal of the British Commissioners of Patents," expressly for the* "AMERICAN ARTISAN."]

3,073.—PROCESS OF RESTORING SPENT INDIGO, ETC.—Francis A. Sawyer, 2d, Boston, Mass.—Nov. 15, 1871.

3,135.—HOISTING APPARATUS.—Charles R. Otis and Norton P. Otis, Yonkers, N. Y.—Nov. 29, 1871.

3,138.—METHOD AND COMPOSITION FOR TREATING PAPER AND FIBROUS MATERIALS TO INCREASE THEIR STRENGTH AND PLIABILITY.—William H. Chase, New York City.—Nov. 20 1871.

3,146.—PROCESS FOR PRINTING ON ENAMELED OR VITREOUS SURFACES.—Samuel J. Hoggson, New Haven, Conn.—Nov. 21, 1871.

3,166.—FEEDING MECHANISM FOR SEWING-MACHINES.—David M. Smyth, Orange, N. J.—Nov. 22, 1871.

3,176.—MANUFACTURE OF SHEARS OR SCISSORS, AND IN APPARATUS EMPLOYED THEREFOR.—R. S. Gladwin and T. D. Hotchkiss, West Meriden, Conn.—Nov. 23, 1871.

3,205.—FURNACES FOR MELTING IRON.—Marvin Wilson, Cold Spring, N. Y.—Nov. 27, 1871.

2,592.—OBTAINING MOTIVE POWER, AND IN APPARATUS EMPLOYED THEREIN.—G. Westinghouse, Jun., Pittsburg, Pa.—Oct. 2, 1871.

3,177.—MACHINERY FOR PRINTING FROM TYPES.—R. Densmore, Meadville, Pa.—Nov. 23, 1871.

3,178.—ARTIFICIAL DENTURES, AND IN BASES FOR THE SAME.—T. A. D. Forster, Philadelphia, Pa.—Nov. 23, 1871.

3,189.—ROTARY OR CENTRIFUGAL PUMP.—G. W. Heald, W. F. Morris, and Emily Sisco, Baldwinsville, N. Y.—Nov. 24, 1871.

3,196.—MANUFACTURE OF IRON AND STEEL.—William Sellers, Philadelphia, Pa.—Nov. 25, 1871.

3,217.—LAMPS OR LANTERNS.—J. W. Bartlett, New York City.—Nov. 28, 1871.

3,220.—CIRCULAR LOOMS FOR WEAVING HATS, CAPS, AND OTHER ARTICLES.—John V. D. Reed, New York City.—Nov. 28, 1871.

3,270.—METHOD OF EXCAVATING ROCKS AND OTHER HARD SUBSTANCES.—Jacob Shelley and M. C. Bullock, Pottsville, Pa.—Dec. 4, 1871.

APPLICATION FOR EXTENSION.

OPPONENTS of extensions must file *written* objections in the Patent Office at least 20 days before the day-of-hearing; and on that day, at noon, they must appear, personally or by proxy, at the Patent Office, and state the reasons of their opposition. All testimony—*pro* or *con*—must be taken and transmitted in accordance with the official rules, which will be furnished on application. The under-named patentee has recently petitioned for extension (for seven years) of patent granted to him in the year 1858:—

JAMES M. WHITNEY, Providence, R. I.—*Hub of Carriage-wheels.*—Patented March 30, 1858; testimony will close on Feb. 27, next; last day for filing arguments and examiner's report, March 8; day-of-hearing, March 13.

THE Troy *Times* says sewing-machines worked by steam are no new thing thereabouts. All the leading linen collar manufacturers there use steam, and have used it for years past in running sewing-machines, for the reason that by its use more work is done, and the effect on the health of the operators is not so deleterious as in the old treadle mode.

MULES 1,000 FEET UNDERGROUND.—Two mules are now employed in the lower level of the Belcher mine, Washoe, to haul the cars from the stopes to the hoisting-shaft. They were let down by being swung under the cage, and behaved very quietly during the process—very unlike a mule under such circumstances. They appear to be very well contented with their subterranean quarters "down below"—a thousand feet from "grass."

THE total coinage of the Philadelphia mint during the past year amounted to $40,187,409. The total number of pieces coined was 13,670,015, of which 173,124 were gold, and 1,824,141 silver. The total coinage of the country from 1793 down to the present time is stated at $1,166,249,531, and the total number of pieces at 1,234,368,946.

Letter Box

G. L., OF R. I.—A very good lubricator for your purpose can be made as follows:—In the top of the plummer block form a small oil cistern, with a vertical tube in the center extending down through to the bearing. Fill the chamber with oil to within a half or quarter inch of the tube, and in this latter insert a woolen yarn with its upper end hanging over into the oil. This will form a feeding siphon, acting on the principle of capillary attraction. The device is recommended by Fairbairn in one of his books on machinery.

N. U., OF MO.—Slate is always measured by the square of one hundred superficial feet. Slates range from ¼ to 7-16 inch in thickness. You can approximately estimate the weight by a simple measurement and calculation. American slate varies from 167 lbs. to 181 lbs. per cubic foot, a good brown slate averaging about 174 lbs.

L. S. R., OF N. Y.—The so-called "nankin yellow" shade in paints is made by a mixture of whitelead, and yellow ochre to which is added some—only a small percentage—of sienn or pink lake.

N. W., OF N. J.—If your pendulum is 39⅛ inches long, it wil vibrate once in every second; once in half a second if 9¾ inches, and once in every fourth second if its length be 2⅛ inches.

R. V. W., OF MASS.—We presume that the ties on the Massachusetts railways are a fair—perhaps a superior—sample of those generally in use. They are seven feet long, and eight inches by twelve in diameter.

F. I., OF N. C.—When first set to work, clay gas-retorts are porous, and considerable gas escapes. We know of no method of preventing this in new retorts, although in some cases the practice has been followed of glazing them internally by charging repeatedly with breeze and tar before using.

A. K., OF OHIO.—A tun of anthracite coal measures 42·3 cubic feet; of bituminous, 44·5; and of charcoal, 123.

T. E., OF N. H.—In the construction of your apparatus you will secure a much better result by causing the currents of heated air to impinge directly against the sheet-metal walls of the chamber, than by allowing them simply to pass along in contact therewith.

A. S., OF PA.—In smelting or refining crude irons with the hot blast, a loss is experienced, as compared with cold blast, of about thirty-six pounds to the tun.

S. U., OF KY.—Other qualities than a high tensile strength is required in boiler-plate. Steel made hard has such strength, but it is liable to crack in punching, riveting, etc. Some eminent engineers hold that a tensile strength in boiler-plates of 75,000 pounds per inch is as great as is consistent with excellence in other respects.

J. T. T., OF CAL.—"Plum mass" is simply plums boiled into a mass. It is used commonly in Hungary as an article of food. Your idea that Californian fruit may be profitably worked up in this way seems plausible.

J. N., OF N. Y.—Glazed or enameled plates of iron applied as a protection to ships' bottoms were patented in this country some eight or ten years ago, by an English projector.

W. O., OF ILL.—Fusible plugs for steam boilers are liable to become inoperative from the oxydation of their surfaces; the oxyd being comparatively infusible. It was suggested some years since to avoid this by coating the plug with a thin film of non-corroding metal, but we do not know how the plan worked in practice.

T. H., OF VT.—Your idea of bruising feed, oats, etc., for horses in lieu of grinding for provender is not new. Your machinery for the purpose, however, appears to be both novel and well adapted to the purpose. We send you a pamphlet of Instructions to Inventors, by mail, as requested. The machine you refer to was patented in England in 1865.

J. M., OF MASS.—You could not obtain a patent on an ointment for gangrened wounds, composed of lard and extract of logwood, for the reason that the same recipe was given in a French periodical, *Comptes Rendus*, some years ago. Your other recipe is quite a different thing, and with it your chances for a patent are good. We will prepare your case on receipt of the first installment Government fee. The descriptive sketch given in your letter of the 15th ult. is sufficient.

A MAIDEN ENGINEER.—A span for the international bridge, 223 feet in length, has just been finished at the works of the Phœnix Iron Company. The strain sheet for the span was calculated and arranged by Miss S. Emma Price, who is connected with the engineers' department of the company.—*Engineering.*

New Explosive Agent.

NUMEROUS attempts have been made to produce efficient explosives from sawdust, wood-fiber, etc., in the same manner as from other forms of cellulose, as cotton and the like. One of the latest of these relates to an improved explosive compound manufactured by a novel treatment of lignine. The wood is disintegrated by a chopping machine. To extract the sap and mineral salts the wood is boiled for six hours with a solution of caustic soda or other alkaline liquid. The fiber is then washed with pure water, beaten and reduced to the proper shortness, and put into a strainer. After being dried, the fibers are steeped in nitric and sulphuric acids for twenty-four hours, and then washed. This is the first dip. For the second dip, the same acids are used. A second quantity of fiber is treated in every respect in the same manner. For the third dip, a third quantity is subjected to the same process. To obtain the proper strength of the explosive substance for fire-arms of any description, the second and third, and in some cases the first, second, and third, dips are mixed together; the whole is passed a second time through the beater, and the pulpy mass is placed in a strainer. It is then molded, pressed, and dried for use.

A CONTRIVANCE of recent date for aerating water produced from the condensation of steam comprises a tank with a series of porous or open-work partitions, some containing wool and felt with the spaces between filled with coke and chalk. The last compartment has a perforated bottom, through which air is forced and rises in minute bubbles.

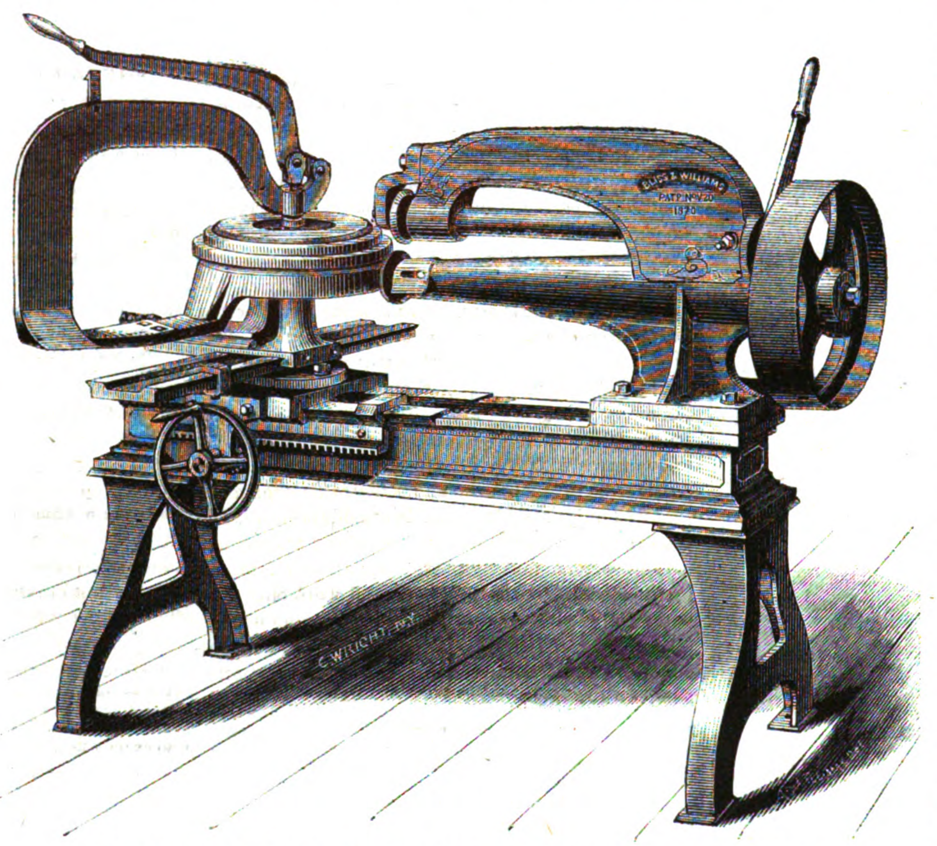
OLD-TIME COMBS.—Forty years ago, ladies' combs, which were larger than ladies' bonnets are now, used to be made in Newburyport, Mass., for the South American market. They were often two or three feet wide, encircling two-thirds of the head, and from six inches to a foot high on the back, the top being wrought in open-work; and to these the Spanish-American ladies attached their veils. One comb consumed three horns, or an equal quantity of shell; and as much of the work was done by hand and with the saw, and the polishing was entirely manual labor, the prices were high—from twenty to fifty dollars.

IT is estimated that grain to the value of 2,000,000 is now stored in the warehouses along the Willamette River, Oregon, and that the principal portion of it is intended for shipment to Europe. Judging from this, the foreign trade of this State Oregon) may be expected to be tenfold greater within the next year than it has been the past The *Oregonian* reports 90,000 bushels of wheat in store at Independence, and 40,000 bushels at Buena Vista.

Bliss & Williams's Machine for cutting Ovals, etc., from Sheet-metal.

THE manufacture of sheet-metal ware has assumed enormous proportions, and of late years has more than ever before called for the most ingenious and efficient of special machinery. We herewith illustrate a machine for cutting sheet-tin and similar material into oval and other forms. It is manufactured by Bliss & Williams, No. 118 Plymouth Street, Brooklyn, N. Y.

The iron frame of the machine has at one end the horizontal arms in which are the bearings of the shafts which carry at their inner ends the circular shears or cutters. At the opposite end of the frame is a device comprising two clamping plates brought together to hold the sheet-metal plate between them by means of a suitably arranged lever, shown at the upper left-hand corner of the engraving. The device, as a whole, rotates with the old-fashioned "trammel movement," and consequently brings the sheet in contact with the cutters in an oval path, the proportions of the oval being adjusted by a suitable previous arrangement of the "trammel movement." The device to which, as a whole, reference has thus just been made, is placed on guides running transverse to the length of the supporting-frame, so that, in case it be desired to cut off any part of the oval in a straight line, the device can be moved in the requisite relation to the cutters. The transverse guide is, in its turn, arranged in guides formed longitudinally upon the frame, so that the turning device may be brought to or arranged at any desired distance from the cutters. These guides also permit the use of an "attachment," in lieu of the device just specifically considered, for cutting squares, triangles, and other shapes, so that by this means the machine may be employed for cutting a very great variety of forms. It may also be used for "inside" cutting, the shaft of the uppermost shear or cutter being capable of a vertical movement through the agency of a lever shown at the right, so that the metal may be cut through at any desired distance from the periphery of the sheet as is requisite in starting the inside cut.



BLISS & WILLIAMS'S MACHINE FOR CUTTING OVALS.

Restoration of the Strasbourg Library.

A MOVEMENT has been set on foot for this purpose, and an honorary committee formed, under the authority of Count Bismarck Bohlen, the German Governor of Alsace, to collect such offerings as may be made in America towards the restoration of not only one of the oldest libraries in Europe, but also one of the most ancient cradles of literature. The committee include Prof. Noah Porter, President of Yale College; Prof. Joseph Henry, Smithsonian Institute; William Cullen Bryant, editor New York *Evening Post;* A. R. Spofford, Esq., Librarian of Congress; Edwin L. Godkin, Esq., editor of the *Nation;* John A. Appleton, Esq. (Messrs. D. Appleton & Co., New York); Andrew C. Armstrong, Esq. (Messrs. Charles Scribner & Co., New York); Melancthon M. Hurd, Esq. (Messrs. Hurd & Houghton, New York); George W. Childs, Esq. proprietor of *Public Ledger*, Philadelphia; J. B. Lippincott, Esq. (Messrs. J. B. Lippincott & Co., Philadelphia); E. Steiger, Esq., New York; Michael J. Kelly, Esq. (Messrs. Kelly, Piet & Co., Baltimore); James R. Osgood, Esq. (Messrs. J. R. Osgood & Co., Boston); Augustus Flagg, Esq. (Messrs. Little, Brown & Co., Boston); S. C. Griggs, Esq. (Messrs. S. C. Griggs & Co., Chicago); Robert Clark, Esq. (Messrs. R. Clark & Co., Cincinnati); Col. M. Richards Mucklé, Ledger Building, 600 Chestnut Street, Philadelphia, Pa.

Authors are invited to present copies of their works, and publishers selections from their lists. Reports of learned, and reprints of publishing societies, and duplicates from libraries will be welcome.

Books and packages should be sent, and all communications addressed to Col. M. Richards Mucklé, Public Ledger Building, 600 Chestnut Street, Philadelphia. Packages may also be sent to Mr. E. Steiger, 22 Frankfort Street, New York.

SASSAFRAS-OIL.—In Richmond, Va., a firm of colored persons has for two years manufactured sassafras-oil on a large scale. The root is purchased at the factory at the rate of 30 cents per hundred pounds, and 40,000 pounds are used per week, producing two per cent., or 800 pounds of unrectified oil. Since this establishment commenced operations, other factories of like description have been started in Virginia. Sassafras-oil is used for scenting toilet-soaps, flavoring tobacco, etc.—*The Plantation.*

AMERICAN ARTISAN

BROWN, COOMBS & CO., Publishers.
ISSUED WEEKLY AT
No 189 Broadway, New York.
S. T. BROWN. J. W. COOMBS.

AGENTS.
American News Company..................New York City.
New York News Company.................. do
New England News Company....................Boston.
A. Winch & Co.................................Philadelphia.
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WEDNESDAY, JANUARY 3, 1872.

TECHNICAL EDUCATION IN BELGIUM AND GERMANY.

We notice, in one of our foreign exchanges, the statement that, for many years past, the managers of German and Belgian industrial establishments have taken a very shrewd and very effective method of making the technical progress of other countries contribute to that of their own. Regular employment, high remuneration, and greatly-diminished expenses, as compared with those requisite to a corresponding condition of life in England, have been held out as inducements to the best British mechanical talent to migrate to the countries named. Nor have these inducements been offered in vain. As a consequence, many skilled Englishmen have entered foreign workshops under stipulations to teach the best of their arts to native pupils.

The thorough educational systems of the German and Belgian states have fitted those designed for industrial pursuits for the most facile acquisition of knowledge, and trained them to habits of system and discipline the most favorable to progress in study and work. It is to these causes, which we have but barely touched upon, that the alleged advancement of Continental industries as compared with those of Great Britain is due. This is of interest, as showing the truth of the proposition that sound intellectual culture in the principles of science as applied to any mechanical occupation, supplemented by teaching from experts not less than by experience gained by practice, supplies the only practicable remedy for the dearth of skilled operatives, which the banishment of the old apprentice system has left us. Indeed, it will do more than that system with its slow and slovenly methods of communicating technical knowledge ever did or ever could do, for it will lead the young artisan to work with scientific exactness, instead of according to the rule of thumb.

AMIANTHUS.

Amianthus, or asbestus, is a material with which (until lately) much experiment has been had and but little accomplished. Of late years, however, its existence in large quantities in various parts of the country has been ascertained, and a cheap and large supply is now confidently calculated upon. The peculiar character of the substance, which, in ancient times, led to its fabrication into incombustible fabrics, fits it for many uses as yet but very imperfectly developed, while its smoothness, when finely disintegrated, has suggested its employment for some purposes for which powdered soapstone has hitherto in some cases been applied, such as the fabrication of anti-friction gaskets for packing, and the like. Its fibrous character has also been taken advantage of in providing a fire-proof material in plastic roofing.

Of course the utility of amianthus for any staple use must, like that of every other material, depend mainly upon its freedom from impurities, and this leads directly to the need of purifying processes, a matter to which comparatively little notice has been given. The latest and apparently the most feasible plan in this line embraces the treatment of the substance with fluorine or hydrofluoric acid gas to dissolve and eliminate the silex and other foreign components of the crude mineral, and thus secure a pure and fibrous condition of the asbestus. Thus freed from grit, it is proposed to reduce it to a flock, and then compress the same into a rope of octagonal, square, or flat form, and with a dense and adhesive structure, either with or without strengthening cords imbedded in the surface, or, as the equivalent of such cords, a covering of canvas or muslin. As proof against heat and acids, the purified material is asserted to possess great merit for packing the journal-boxes and other parts of machines exposed to excessive friction. How far the claims urged *à priori* in favor of this curious mineral, so long known to have the most useful properties, but only at the present time beginning to find some prospect of extended application, can only be told by practice; but there is no doubt that it affords a promising field for investigation with a view to its use in many widely different industrial arts. This remark will also apply to another mineral, mica, that now meets with but slender employment as a material for stove-windows and a few other even more limited purposes. It occurs in considerable quantities in various portions of the Southern States, and we have been told by parties apparently familiar with the subject that, if a demand were once created sufficient to justify its systematic production, it could be laid down in the New York market at one-fourth of the prices that it now, as a special and little-called for article, commands.

WOODEN SCREWS, ETC.

For pressing hops into bales, and for many analogous purposes, a wooden screw, six or seven inches in diameter, with thread of an inch and a quarter pitch, and working through a nut formed in a beam framed into the building where the press is used, is found to be at once the cheapest and the least liable to derangement of any appliance known. An iron screw will, to be sure, occupy less space and work with less power. But for baling—especially in agricultural localities—the apparatus is necessarily subjected to much rough usage, and often managed with little mechanical skill. As a consequence, a cast-iron screw is very apt to be broken and a wrought-iron one to be bent in the course of a comparatively short period, whereas a wooden screw, if sheltered from decay, will outlast, in the term of its usefulness, the undetermined durability of a wooden clock. Their clumsiness is in practice but a small drawback, but their excessive friction is of more consequence. Oils are not used for lubricating because they would swell the fiber and roughen the surface, but recourse is had to that homely substance, soft-soap, as a lubricant, which only imperfectly subserves its purpose. It is therefore a desideratum that the timber of which these screws are made should be subjected to some preliminary treatment, which, after being turned to shape, would prevent the grain of the stuff from rising by contact with oils. Perhaps saturation in a kiln with oleaginous substances would secure this result with the firm-textured birch of which such screws are made, and, at all events, the experiment is worth trying. Nor would its results, if successful, be confined to the matter in hand. In many branches of construction, wooden journals and bearings, either from considerations of economy or some other, are frequently found desirable, and any preparation of the material that would diminish its frictional loss would be pretty sure to find a wide application. The same remark will apply as well to any improved lubricating substance especially adapted to diminish the friction of wood upon a surface of the same material. In these matters there exists a necessity for practical experiment and practical improvement that certainly deserves attention.

PREPARING TANNING MATERIALS.

We last week called attention to the alleged—and probable—advantages of shredding tan-bark for use in lieu of the common disintegration of it by grinding. The subject is suggestive of a decided change in the possible management of tanning material from the time it is stripped by the spud until it comes out from the leach. It is only with the more primary portions of such treatment that we here purpose to speak, and that but briefly.

The rossing of the bark deprives it of the outer portion, containing little or no available tannin, and diminishes its bulk and weight, say, seventy-five per cent., saving in the same proportion the cost of carriage and grinding, from which, of course, must be deducted the cost of rossing. Let us suppose that this method of fitting the material in the wood for use was extended further; that the bark passed direct and automatically from the rossing-knives to shredding mechanism, and thence on endless aprons to presses which would put it into bales, like, for instance, those in which the shredded wood used for mattresses and known as "Excelsior" is brought to market. Would not the material as thus prepared prove in tanning value per dollar's worth in cost, of much greater use to the leather manufacturer than the bark as now fitted for the leach, and more so than the extracts of bark somewhat extensively in use?

HEATING RAILWAY-CARS.

This subject, of perennial interest as well as of continual experiment, has lately had an addition to its current history in the adoption, at least for trial, of a new device by the Reading Railway Company. The apparatus is described as comprising a furnace, substantially the same in all essential respects as the ordinary air-heating furnace, suspended underneath the car by light iron rods. These rods are designed to give way in case the heater is brought in contact with the ground by the jumping of the track by the car, and thus disengage the otherwise incendiary appliance from its place. This, on the occasion of a recent accident, occurred, and the inventor had reason to congratulate himself on the practical success, in this respect, of his system. Provided the floor of the car be fire-proofed, so that no danger of ignition from the furnace in its normal position need be apprehended, this plan of suspending the furnace seems to possess considerable merit, and, it is quite possible, will form an integral feature of the yet-to-be-devised even approximately perfect apparatus for warming cars.

In the appliance above mentioned, the heater warms air, which is conducted by flues under each

seat, and there discharged, as in dwellings, etc., heated air is discharged through a register. No doubt this works as well as any method embracing the employment of hot air injected into and mingling with the atmosphere within the car. But scientists have demonstrated that a wide difference exists between heat thus supplied and radiant heat from a heated metallic or other surface. In the former case, the hot air, with its great avidity for moisture, abstracts it from lungs and cuticle of the passenger, and causes a fevered excitement of the system, while in the other the heat passes through the air, and, from the slight capacity of the air for absorbing heat, passes through and communicates warmth without discomfort. This should be kept in mind in all projects to secure the end under consideration; and the safe arrangement of the furnace should be combined, in all cases, with some means of warming the interior of the car by radiant instead of communicated heat.

Block Coal.

On page 372, Volume XIII., of the American Artisan, we published a brief sketch of the block coal which, it appears, constitutes no inconsiderable part of the mineral wealth of an extensive tract of country in the West. The following from the N. Y. *Tribune* contains additional data on the subject:—

"The term 'block,' as descriptive of a peculiar class of coals, is an alliteration in the geological vocabulary, but it has now become so firmly rooted that it must hereafter be recognized. The physical characters of the coal are these:—There are two systems of joints, traversing the seam perpendicularly, which cut the whole mass into quadrangular blocks two or three feet long and a foot or more broad, and the miner, availing himself of these natural divisions, after having undermined the base, is enabled to pry out the blocks without a resort to gunpowder. He can easily take down three tuns a day. These joints appear to have been formed after the materials entering into the structure of the coal were deposited, and are due to a force acting independently of that of consolidation. Where a considerable area is laid bare by stripping the surface, the seam resembles a tessellated pavement. Viewed in section, the appearance is as though block upon block, each of uniform size, had been piled up by the hands of man. In entering the drifts, the zigzag appearance reminds one of a Virginia fence. The sides of the blocks are smooth, of a dull-bluish color, and are often stained white with fire-clay, but, if cleft longitudinally, there is seen a mass of mineral charcoal so slightly cemented with bitumen that it readily crocks on handling. The blocks are splintery on cross-fracture, but longitudinally they come out in thin, flat sheets like roofing-slate. Such are the external characters of the coal near Brazil; but further south in Spencer County, while it has the same block-like arrangement, it is so far consolidated that it breaks longitudinally with a splintery fracture, and may be rubbed with a white handkerchief without communicating any crock.

"This coal when thrown on a fire at once ignites with a crackling sound, and burns with a bright-yellow flame, giving off little fuliginous matter. It is non-caking, or, in other words, does not run together, thus affording free air passages. It is so far free from sulphur that it leaves behind a white or gray flocculent ash, and, subjected to the strongest draughts, it gives no clinker. Hence, it is an admirable coal for locomotives, by reason of its rapid combustion, its freedom from clinker, and its disposition not to form a hollow arch, which in the fatty coals must from time to time be broken up to afford free air passages. These qualities, too, insure the integrity of the grate-bars wherever burned. It is sufficiently firm to hold up the burden of a furnace, and the only inconvenience experienced is in the amount of 'dust,' or fine particles of mineral charcoal, which are nearly incombustible. This inconvenience appertains to the coals at present used in the blast furnace, but it would be absent in the more compressed coals before referred to. From careful assays it is ascertained that this coal gives from 57 to 62 per cent. of fixed carbon, a small amount of hygrometric moisture, and a small amount of ash, whose whitish and flocculent character would indicate the comparative absence of the bisulphuret of iron.

"The Pittsburg coals differ very slightly in composition from the block coals of Indiana, and yet we know that they behave altogether differently in combustion. The latter will make iron in a crude state, while the former require that the volatile materials be expelled, and the product used in the form of coke. This difference probably results from the mechanical texture of the coals. In the case of the block coals there are thin partitions of a cannel-like nature, which prevent the cells, filled with bitumen, from coalescing and rendering tumid the whole mass.

"The volatile materials play an important part in the combustion of coal. We know that the anthracites of Pennsylvania, which contain eighty per cent. or more of fixed carbon, in a strong draught burn well, and are highly esteemed not only as a household fuel, but for steam and iron-smelting purposes; while the Rhode Island anthracites, still richer in fixed carbon, will be consumed only in the great day of universal conflagration. So far as relates to the presence of the deleterious elements of sulphur and phosphorus in the block coals, little has been done by the chemists to estimate their quantity. In fact, this remark will apply to most of the assays of coals in the United States. I requested Prof. Delafontaine, a gentleman every way competent to enter upon this investigation, to apply the tests to the splint variety of the Brazil seam occurring in the western part of Spencer County, and specimens were selected from what is known as the Staab Mine for that purpose. The assay of two specimens of this coal by the ordinary method gave the following results:—

Water at 212° F.	1·86	3·91	Fixed carbon	58·23	62.31
Volatile matter	37·11	30·34	Ash, white	2·80	2·44

"Two and one-half ounces of this coal were submitted to distillation in a closed vessel with the following result:—

Coke	63·05	Water approximatively	15·11
Tar approximatively	15·30	Gas	5·97

"The water contained ammonia and other soluble chemicals, besides a small amount of hydrosulphate of ammonia. The amount of phosphoric acid was 0·3, and the amount of sulphuric acid was 0·0.

"Compared with the English coals of Pontypool, Bedwas, Ebor Vale, etc., the amount of phosphoric acid in the latter was far greater in every instance; and while in the English coals there was a notable percentage of sulphur, in the Staab coal there was an entire absence. Comparing these results with the amount of phosphoric acid contained in the ashes of elm, oak, and apple-tree wood, the result is that, while the Staab coal contains only 0·3 per cent. of this deleterious ingredient, these wood ashes contain all the way from 4·19 to 9·61 per cent. Thus it will be seen that there are coals in the Indiana fields which are freer from the element phosphorus, so deleterious in iron-making, than charcoal itself. The same rigorous tests ought to be extended to every portion of the Brazil seams.

"These block coals, we know from experience, when tested in a blast furnace have all the qualities of charcoal, combined with a greater reducing power. Two and one-half tuns of coal are required to make a tun of iron. They are not quite as strong in fixed carbon as the Mahoning and Shenango coals, where two tuns only are required, but they produce a more highly esteemed pig-metal. What Mushet said in his great work on iron, in reference to a certain Welsh coal, is applicable in every respect to the block coal of Indiana:—

"'To the purity of splint coal it unites all the softness and combustibility of wood, and the effects produced by it in the blast furnace, either as to the quality or quantity of iron, far exceed everything in the manufacture of that metal with charcoal.'

"Prof. Cox, in charge of the Indiana State Geological Survey, bears the following emphatic testimony as to the quality of these coals for iron-smelting:—

"'Without fear of contradiction, I pronounce the block coal of Indiana the best mineral fuel yet known to the world for the manufacture of pig-metal, bar iron, or steel. In the blast furnace it produces a metal in every respect equal to the best charcoal iron made from the same ores. In the puddling furnace a less quantity is required of block coal than of the best Pittsburg coals to make a run of bar or wrought iron. The bars are brought off in a shorter space of time, and the quality of the iron is better. The gray pig-iron, made with the raw block coal, in Clay County, from a mixture of Lake Superior and Missouri hematite ores, is used with excellent results in the manufacture of Bessemer steel at Chicago. Mr. Robinson, the Superintendent of the Union Rolling Mills there, writes that "the Indiana coal seems to be just the thing for steel."'

"It is a significant fact that the puddled iron made at Indianapolis from block coal pig is employed at Pittsburg in forging gun-barrels."

Tests of Artificial Fuel.

On page 105, Volume XIII., of the American Artisan, we referred at some length to the production of artificial fuel from coal dust cemented into blocks by clay, and on page 172 gave a communication from Mr. Loiseau, the inventor of an improved method of manufacturing such fuel, which detailed the peculiarities of his process and the advantages claimed for the product. Mr. Loiseau has sent us a report, which we present below, very lately made by a Committee of the Franklin Institute to test the practical merits of the fuel. It is stated that the article tested was hand-pressed, and consequently not as dense as would have been the case had it been made by power machinery.

"The Committee report that they have made trials of the samples produced from anthracite and from bituminous coal. The mode of manufacture as related by Mr. Loiseau is as follows:—

"1. Anthracite small coal and dust were mixed with seven per cent. of *clay*, and compressed into cylindrical molds about four and a half inches in diameter and four inches deep, or else into spherical masses about three inches in diameter.

"2. The molded masses are placed for a few minutes in a bath of *benzine* in which *rosin* has been dissolved, and from which they are removed and dried by an exposure to a current of air.

"The object of coating them with a film of rosin is to prevent the absorption of moisture, and consequent softening of the clay; the solution in benzine penetrates the mass of coal and clay to a depth of about 1/4 inch, and so efficiently closes the crevices that samples immersed in water for *twelve hours* were found dry in the interior, when broken up for examination.

"Both the anthracite and bituminous fuels were burned in a furnace measuring nine inches in diameter and seven inches in depth; each variety of fuel burned freely, and was completely ashed; but the intensity of the combustion was less than that produced by anthracite or bituminous coals of small size burned in the same furnace. These comparisons were made with a moderate and also with a strong draught.

"The average amount of ash obtained from the anthracite artificial fuel was 16 per cent., and from the bituminous artificial was 18·5 per cent.

"The heating powers as obtained from trials in Thompson's apparatus are as follows:—

	lbs. of water.
1 pound of anthracite artificial fuel evaporated....	4·30
" " " "	8·50
" " " "	7·86
" " " "	6·76
An average of....................................	6·85
	lbs of water.
1 pound of bituminous artificial fuel evaporated....	9·35
" " " "	11·11
" " " "	12·88
" " " "	10·61
An average of....................................	10·99

"The anthracite average is 7·40 lbs. of water; the average of bituminous is 14·88 lbs. of water. The non-uniformity of result is partly due to the imperfect manipulation in mixing the coal and the clay, and partly to the varying amounts of solution of rosin absorbed in the bath to which the material is subjected. The imperfect manipulation can be remedied by the adoption of proper machinery for that part of the process.

"The ability of the artificial fuel to bear transportation is less than that of anthracite or good lump bituminous coals, but the structure is firmer than that of many bituminous and semi-bituminous coals that are carried to market. The masses will generally break up with a fall of three feet upon a stone pavement, but are strong enough to bear ordinary handling and transportation, and, should they become broken, will suffer no damage unless exposed to wet.

"The samples of artificial fuel examined are well adapted for use for purposes in which great intensity of combustion is not desired.

"For the production of steam in stationary boilers, and for household purposes, it can be employed equally as well as any ordinary coal, and, whenever the cost of preparation is less than the cost of mining coal, this invention will make available the immense amounts of small coal now allowed to remain useless at the coal mines. It appears to work far better than the balls or bricks of *coal dust,* and *clay,* and *lime,* that came into vogue in this city many years ago, when anthracite was brought to market without preparation by the coal-breaker, which had not then been invented, the balls or bricks thus made not having the protection from wet secured by Mr. Loiseau by his resinous coating.

"We consider the method of preparing artificial fuel from waste anthracite and bituminous coals, as presented by Mr. E. F. Loiseau, as ingenious and well adapted to the purpose and worthy of the attention of those interested in the production of a cheap fuel, adapted to a great variety of uses."

Manufacture of Clock Springs.

As the system of hardening main-springs in a loose coil could not be depended on for making good springs in large quantities, and as the plan adopted by watch main-spring makers for hardening the steel in rolls coiled *close* together could not be used, for the reason that the greater breadth and thickness of the clock springs rendered them less elastic when in the hard state, and therefore could not be put through the operations afterwards necessary without breaking, the plan of hardening the steel in straight lengths was experimented upon and finally adopted. The system has its foundation in Washburn's patent for tempering piano wire by tension, but, like every other great improvement, it was not completed at one time or by one man; and, without entering into any particulars about priority of invention, we will proceed to describe the accumulated improvements which are now combined and in operation.

The steel from which the springs are made is imported, and comes to the factory in rolls about three inches wide, each roll containing from forty to one hundred feet. It is first cut up into ribbons of the desired width, which vary according to the breadth the springs require to be—the narrowest usually being about three-tenths of an inch, and the widest about one and a-half inches. These ribbons are cut by circular shears, which are simply steel disks or rollers, with square, sharp edges, and fastened on arbors so that the edge of the one disk shall slightly overlap the edge of the other; and, when the disks are made to revolve, they cut the steel in the same manner as shears, only the cutting motion is a continuous one. If the springs to be made are to be one and a-half inches wide, the circular shears are arranged to cut the sheet into two ribbons; but, if the springs are to be three-tenths of an inch in breadth, the shears are arranged to cut the steel into five ribbons at the same time, and so on. The end of the sheet of steel is introduced into the machine, and, when the circular shears are set in motion, the sheet is cut up into ribbons as fast as a boy can walk and carry away the ends. The pieces of the same breadth are then riveted together at the ends into one continuous length, and coiled on to a large reel, and taken to another apartment to be hardened, tempered, polished, and colored.

The furnace in which the steel is heated consists of a brick structure, six feet long, about three feet wide, and about four or five feet high. The furnace-bars, as is usual in other furnaces, are placed some distance from the ground in order to secure a good draught of air; and this draught is increased by an iron tube full of holes, which is placed below the furnace-bars, and into which a stream of air, generated by a circular blower, is introduced; and by this means an equal draught is produced through the entire length of the furnace, and the fuel made to burn evenly. In the center of the fire, an iron tube, six feet long, six inches wide, and about two inches deep, is fixed, and kept red-hot all the time, and through which the steel passes, preventing it from coming in contact with the fuel. The wooden reel or drum on which the long ribbons of steel have been wound is placed on a stand at the end of the furnace, in such a manner that it will revolve with the necessary freedom, but not too free, neither too stiff. The end of the steel is then passed through the hot tube, and, in passing through, is heated to the desired redness; and then it is again cooled by passing through a tank of oil, four feet long, two feet broad, and about three feet deep, which is placed in the inside of a larger tank, placed at one end of the furnace, and through which a constant stream of water is kept running to keep the oil cool. The steel then passes through a bath of molten lead, which gives to it the necessary temper; and afterwards it passes between iron rollers—an arrangement designed to regulate the rate of speed which the steel has to travel through the furnace; and, lastly, the tempered steel is coiled on to a reel the same as the one it came off when it was in its soft state, and which has been placed in a convenient position to receive it, and is made to revolve slowly by machinery. If the broadest strips of steel are being hardened and tempered, only one breadth is done at a time; but of the narrower widths several lengths usually go through the furnace at the same time. About one thousand feet a day is the rate of speed the broad strips are hardened and tempered, and a proportionably greater number of feet for the narrower strips, according to the number of breadths done at the same time.

The arrangement for equalizing the strain or tension on the ribbon of steel, and thereby keeping it from twisting or bending in the hardening, and also the plan for regulating the speed which it is desired the steel should travel according as the heat of the furnace varies, is worthy of special notice, although without drawings it is impossible to give a clear description, further than mention that the iron rollers which the steel passes through after coming out of the molten lead are placed on a platform, and inside the platform are a pair of reversed smooth cones, with a belt running on them. These cones are connected with the iron rollers that draw the steel through the furnace, and also with the reel that coils up the steel after it has been tempered, and any alteration of the position of the belt on the cones alters their speed; and the man who is attending the furnace is thereby given complete control of the passage of the steel, and the quantity of heat in the furnace.

The rolls of steel, having been hardened and tempered, are taken to a machine to be polished and colored. This machine consists of a long and very strong frame, in which a series of wooden rollers, covered with leather, are running. The rollers are inclosed in boxes full of emery, and the strips of steel are run over the one roller, and below the other, in such a manner that both sides are polished at once; while at the same time, the edges are smoothed and rounded by two vulcanite wheels, one working against each edge of the spring. The strips of steel then pass through molten lead the second time, simply to color the steel and prevent oxydization, the color used usually being a dark-straw color. The steel, after being in this manner hardened, tempered, polished, and colored, is cut up into lengths necessary for the particular description of spring that is desired. This is done by an experienced workman, who in passing the steel through his hand feels the strength of every inch of it, and a soft piece is instantly cut out and thrown aside. The ends are then softened, and the hooks and eyes put on, and the springs are afterwards coiled up on a machine, the same in principle to the one watchmakers use to put main-springs in their boxes. In this operation great precaution is used to detect bad springs; each one being wound up twice before the clasp is put on, and if it does not spring out as it ought to do, it is thrown aside as being too soft. There is ample testimony to prove the great superiority of these springs over those made by other

methods; but we will only instance one case, where a number of clocks, with springs ten feet long, could not be got to run longer than seven days. The old springs were removed, and springs nine feet long, made in the manner we have described, put in their place, and the clocks ran nine days before stopping, which was two days more time with one foot less of spring. These springs are sold at prices varying from fifteen to forty cents, and we have seen a great many of the size sold at forty cents which we consider to be little inferior to springs that were made singly and by hand that cost three dollars. So the difficulty of making good springs at a cheap rate, which was such a formidable barrier in the way of making small movements, suitable for handsome mantel clocks, may be considered to have now been satisfactorily overcome.—*American Horological Journal.*

Concerning Plumbago.

TWENTY years ago there were only two establishments in this country using plumbago, and the entire consumption at that time was about 100 tuns per annum. Part of this was from Ceylon, and was used for making crucibles, and the rest of it was the Dutch black-lead, which, as it dissolved readily in water, was used for stove-polish. So great has been the increase in this trade that there are at present 14 establishments in this country where plumbago forms the basis of the business, and the importations have been increased to 2,500 tuns a year. About 1,000 tuns of this is used for the manufacture of crucibles, and the consumption for stove-polish is estimated at about 1,200 tuns per annum. The remainder of the amount imported is used for making paint for the electrotyping and lubricating purposes, but a small quantity as yet being used for lead-pencils. Although the trade is yet young, there is invested in it an aggregate capital of about $2,000,000, upon which there is made an annual profit of about from 20 to 30 per cent. The manufacturing of this material is done to a great extent by machinery, so that the entire interest does not furnish work for over 1,000 persons.

As already mentioned, the great trouble with the Ceylon plumbago was the difficulty experienced in grinding it to the required fineness. The material is soft and readily crumbles, but, when subjected to the action of the ordinary mill, it will form a solid cake, over which the grindstone or rollers will pass without making any impression, unless constantly "picked." To obviate this difficulty, Mr. Dixon constructed a mill for himself on a very ingenious principle. It consists of an iron saucer about 4 feet in diameter, the bottom of which is made of bolting cloth. This apparatus revolves upon a central shaft at great speed. Four iron balls are arranged inside the saucer to revolve around the edge of it with equal rapidity, but in opposite directions. When the machine is in action, the centrifugal motion throws the lumps of crushed plumbago to the edge of the saucer, and the balls passing over them reduces them to powder. While this grinding process is going on, a current of air is continually passing through the mill, entering at the top and finding a vent through the bolting cloth at the bottom. When the plumbago is sufficiently pulverized, the draught carries it through the cloth. By this means the plumbago can be reduced to any degree of fineness by simply changing the texture of the cloth at the bottom of the mill. When intended for crucibles, the ground plumbago is mixed with a peculiar kind of clay which comes from Mayence on the Rhine. This clay is also powdered. The two materials are then mixed together with water, and molded into crucibles, after the manner of ordinary crockery. They are burned in an oven, and are ready for use. For stove-polish the plumbago is simply ground and subjected to a pressure of about 14 tuns to a quarter-pound block, which compresses the dry powder into a solid block. These blocks are then wrapped in paper, and are ready for sale.

Attention having been directed to this material and its commercial importance, various discoveries of it have since been made in this country. It has been found in nearly all the States and in Canada, but its production has never attained any importance. The chief cause of this is that the American graphite is found in particles or scales, disseminated in the rock or interspersed with rhombspar, and before it can be used it must be separated. This is accomplished by crushing the whole mass in water and floating off the plumbago. In Ceylon, the plumbago is found in a pure state in veins, and it requires no working at all further than grinding before being used. The only difficulty connected with the Ceylon mines is the doubtful supply. This arises from the superstitions of the native miners. The deposits of plumbago are said to be inexhaustible, but the natives will not go below the ground after it. They simply open a large hole and pick out the plumbago, but when they get to the depth of a few feet they stop and begin at the surface again. The natives employed in these works belong to the third caste, and their superstitions will not allow them to go below the surface of the earth. Under these circumstances, the ordinary modes of mining by sinking a shaft and drifting along the vein must be abandoned, and the plumbago collected from the surface. These drawbacks rather tend to depress the trade, and, as the supply can never be depended upon, an opportunity is given to speculators, who have at times bought up the entire stock on hand, and made their own prices.

The principal shipping port of this material at Ceylon is Colombo, and it is sent there directly from the mines. From Colombo it is shipped to London, where it is sold at auction in the same manner that all India products were sold a century ago, in the days of the British East India Company. No enterprise has ever been shown on the part of those who control the trade at Ceylon or in London. Cargoes coming to this country are delayed unnecessarily, and orders are filled so carelessly that great inconvenience is experienced. At present there is no regular freighting between the United States and Ceylon, so that almost the entire supply for this country comes through the London market. This is made necessary by the persons controlling the trade, so that there is no possibility of the American manufactures importing direct.—*Iron Age.*

The Bilbao Iron Ore Company.

A COMPANY under this title has been formed in London, for the purpose of acquiring the concessions from the Spanish Government, held by Sir John Brown, and Mr. William Fowler, Chairman of Sheepbridge Coal and Iron Company, of the extensive iron mines known as the Mines of Galdames, or La Escarpada, La Cenefa, Berango, Morucces, and El Cerrillo, near Bilbao, in the Province of Biscay, and for working these mines, and making and working railways in connection with them. The mines of the Bilbao district have been worked from time immemorial, and yield from 50 to 60 per cent. of metallic iron closely resembling Cumberland hematite. A very good board of directors has been appointed, including Sir John Brown, Mr. J. Galloway, Knott Mills, Mr. Fowler Mr. Braby, and others. The capital is £500,000. The enterprise is, we think, worth the attention of capitalists.—*English Paper.*

Substitute for Lithographic Stone.

IT is now proposed, but with doubtful promise, to substitute ordinary lithographic stone by the use of a smooth block of wood coated with glue or other gelatinous matter, or with a solution of silicate of soda and bichromate of potash, exposed to sunlight and washed. An ink or pigment is made with gelatinous matter dissolved in a saturated solution of bichromate of potash, with or without chrome, alum, and with a small quantity of ivory black to render the ink visible. On the prepared block or slab the desired picture or other work is made with this ink, and when dry exposed to sunlight. After exposure the surface is covered with gum or glycerine, and is then ready for the printer.

A Florida Railroad.

A NORTHAMPTON lady who recently went to St. Augustine, Florida, writes back that the hardest part of her journey was the last fifteen miles before reaching St. Augustine. They cut the wood as they went through the woods, and watered the engine by dipping up the water in buckets on the road-side; when they got up steam enough to get off, the same hands ran on before to sprinkle sand on the wooden rails, in order to travel the distance of fifteen miles in four and a half hours. She says she was thoroughly provoked, as the road was built by a Connecticut Yankee and run by him.—*Pittsburgh Chronicle.*

Metal for Bearings.

THE following alloy has been found to give highly satisfactory results for plummer blocks, axles, brasses, etc. To 30 parts of melted copper are added 70 parts of antimony; the mixture is melted, and run out into thin plates. These are then remelted with tin in the proportion of 90 parts of tin to 10 parts of the copper and antimony, and run out again into thin plates. When used, it is remelted, and run into the forms required. M. Vo k, of Regensburg, has employed an alloy for many years of which the following are the component parts:—Copper, 5·6 per cent.; antimony, 11·2 per cent.

NEW AMERICAN PATENTS.

WE give, as follows, notices of some of the most interesting inventions for which Letters-Patents of the United States have recently been issued:—

BOOT AND SHOE.—M. Bray, Newton Center, Mass.—*Dec.* 19.—This boot or shoe has a detachable heel, the outer sole of which is cut short at the rear end, and has a peculiarly formed heel-plate for securing the heel, whereby the larger portion thereof rests upon the upper and inner sole and is secured thereto, while the forward part incloses the rear end of the under sole and is firmly secured to the said sole. The heel-plate is constructed with a recess to receive the rear end of the outer sole.

METER.—M. Fogarty, Boston Highlands, Mass.—*Dec.* 19.—The more essential feature of this new device is found in the combination with a main cylinder and its two induction and eduction ports at its opposite ends of auxiliary and parallel induction and eduction cylinders, each having a reciprocating piston in line with the inlet or outlet of the cylinder, and each piston being arranged to operate at each movement as a valve to close entrance into one chamber of the induction or eduction cylinder, and open entrance into the other chamber thereof.

GRAIN THRASHER AND SEPARATOR.—C. S. Hall, Rochester, N. Y.—*Dec.* 19.—This invention comprises an endless raddle composed of slats arranged in combination with a suitable agitator, whereby the grain is permitted to pass between

the slats above and below said raddle when thrown out of line by the agitator. Also, the combination with the thrashing cylinder of a grating having a smooth upper surface, and provided with openings running parallel with the line of rotation of the cylinder. Also, the grating constructed in the manner previously indicated, and made adjustable vertically by means of regulating screws or their equivalents.

COLORED PAPER.—G. La Monte, G. G. Saxe, and C. H. Clayton, New York City.—*Dec.* 19.—This improved paper is superficially dyed in the sheet, in or immediately after the process of sizing, during the course of manufacture, and with colors which are fugitive under the action of the acids and alkalies employed for the fraudulent removal of writing, for the purpose of affording a double means of disclosing the alteration of written documents, whether effected by erasure or by the use of chemicals.

REMOVING TIN FROM TIN-SCRAP.—C. Lennig, Philadelphia, Pa.—*Dec.* 19.—This process embraces the recovery of tin from tinned metallic surfaces in the shape of tannite of soda or potash, or as metallic tin, by the use of caustic alkalies and air alone, oxydizing the tin by the absorption of oxygen direct from the air when moistened by alkaline solutions.

MODE OF CUTTING BOOT AND SHOE SOLES.—S. J. Shaw, Marlborough, Mass.—*Dec.* 19.—This new article of manufacture consists in a boot or shoe sole formed by uniting by a lap-joint in the shank two pieces of leather of different qualities. The invention also includes patterns suitably formed of different qualities of leather to be divided and formed into soles.

BOILER FOR DOMESTIC PURPOSES.—F. Till, Reading, Pa.—*Dec.* 19; ante-dated *Dec.* 1.—The essential features of this improvement comprise the combination with a stove or range of a tubular boiler, provided with supply and discharge water-pipes, and arranged within a flue so as to be heated by the waste products of combustion of the stove or range. Also, the combination of the subject-matter of the preceding claim and a heating pipe extending from the boiler into the stove-pipe. Also, the boiler in combination with a stove or range, and arranged within a chamber or flue provided with registers.

RUBBER ERASER.—W. N. Bartholomew, Newtown Center, Mass.—*Dec.* 19.—This rubber eraser is composed of a stick or pencil of vulcanized rubber erasive compound of distinctively pencil-like form, and a surrounding sheath of paper, leather, or equivalent material, the two being united by glue, or other cement which, like glue, will harden on drying.

STEAM-RADIATOR. — E. P. Doyen, Portland, Maine.—*Dec.* 19.—This inventor claims an upright section of a steam-radiator, cast with a continuous interior steam-space, and provided with vertically arranged ribs notched in diagonal rows, thereby forming radiating surfaces in excess of condensing surface.

SECTIONAL STEAM-GENERATOR.—D. C. Howell, Goshen, N. Y.—*Dec.* 19.—The most noticeable characteristic of this novel steam-generator is the use of two sets of inclined steam-generating tubes crossing each other, combined with opposite chambers, connected at top and bottom by return tubes, so that the same water will alternately pass through the two sets of generating-tubes and be kept in continual circulation until converted into steam.

POSTAL CARD.—W. J. Ludlow, Cleveland, Ohio. *Dec.* 19.—This improvement includes a postal card folded at or near its center, and with its edges gummed. The claim also covers the card as a new article of manufacture, folded at or near its center, and gummed upon its inside edge, the ends being left open.

LIGHTNING-ROD.—M. D. Phelps, Bristolville, Ohio.—*Dec.* 19.—This lightning-rod is constituted by a straight copper core surrounded by three or more twisted wires.

PUMP PISTON.—J. Van Tassel, Toledo, Ohio.—*Dec.* 19.—The peculiar feature of this device lies in the employment of a solid piston-head, consisting of a recessed part and follower, with alternate rings of different sizes of metal and rubber, or other suitable material, clamped between them by means of a screw and nut on the end of the piston-rod.

RESERVOIR STOVE.—J. V. Vrooman and J. H. Clute, Schenectady, N. Y.—*Dec.* 19.—In this fuel magazine or reservoir stove there is arranged within the combustion chamber combined vertical flue-strips and a register or sliding damper, with or without intermediate flue-strips, suitably arranged.

PLOW-FENDER.—A. R. Webber, Saratoga Township, Ill.—*Dec.* 19.—The gist of this invention is found in the construction of a plow-fender, consisting of a rod provided with a convex shovel and roller, and either with or without a supplemental block, when adjustable vertically by means of eye and staple bolts, and attached to the plow-beam forward of the plow.

HINGE.—W. T. Wells, Decatur, Ill.—*Dec.* 19.—This is a sheet-metal T or strap-hinge, with the ends of both the straps or strap and leaf extending around and beyond the pintle, and secured by rivets, or by the screws, nails, or bolts by which the hinge is put on.

WASH-BOWL.—W. Westlake, Chicago, Ill.—*Dec.* 19.—As a new article of manufacture, this device comprises a wash-basin having its body composed of tin, with a thin sheet of non-corrosive metal soldered over the inner surface of its bottom.

TREADLE FOR SEWING-MACHINES.—J. B. Winslow, Charlestown, Mass.—*Dec.* 19.—This improvement consists in the arrangement of one or more treadle-levers, made in one piece, with a cog segment rocking around a fulcrum, and operating a pinion and jointed pawl either on the inside or outside of a smooth drum, for the purpose of driving a sewing-machine.

RAILWAY BRAKE.—Chauncey H. Lathrop, Hudson, N. J.—*Dec.* 26.—This invention consists in a novel combination and arrangement of detachable end bars or shaft connections, with universal couplings at the ends of shafts arranged to run in direction of the length of the cars or vehicles of which the train is composed, whereby the train or any number of its cars is supplied with a continuous line of shafting for application of the brake by power from the locomotive or an independent engine at the one end of it, without restricting the free movement of the cars and without interfering with the coupling or uncoupling of them.

MACHINE FOR PICKING HAIR ROPE.—Gelston Sanford, Bergen Point, N. J.—*Dec.* 26.—This machine is composed mainly of feed rollers, a picker cylinder, and an interposed rotating internally screw-threaded untwisting tube, whose axis is arranged perpendicularly to those of the feed-rollers and picker cylinder. Hair rope introduced between the feed rollers is untwisted by the aforesaid tube, and is afterwards picked up by the teeth of the picker cylinder, removed by a doffer, and the picked hair is delivered in a condition ready for use for upholstery and other purposes for which curled hair is used.

APPARATUS FOR MEASURING SILK, THREAD, ETC.—Leonard F. Dunn, Oneida, N. Y.—*Dec.* 26.—This improved apparatus is designed for the measuring of silk and other threads put up on spools, and is applicable either as an appendage to a spooling machine for measuring the thread as it is wound on the spool, or as a separate device for measuring by unwinding the thread from the spool. The invention consists in a combination with the revolving spindle which carries the spool, of a friction-wheel connected with the registering mechanism, and provided with a stop for arresting the motion of the wheel when releasing it from contact with the spool; likewise a combination of devices whereby the spool, spindle, and friction-wheel driven by the thread on the spool are automatically and simultaneously set in motion and stopped, for the purpose of securing accuracy in measurement of the thread.

OPERATING RAILROAD SWITCHES.—Arthur C. Devlan, Altoona, Pa.—*Dec.* 26.—This invention consists in a novel combination of mechanism for operating railroad switches, whereby the inventor is enabled to arrange the switch-lever so that in being operated it occupies a position and moves in directions parallel to the track, or thereabouts, as contra-distinguished from a motion which is transverse thereto, and is consequently more out of the way and less liable to be accidentally shifted or struck; also, whereby the thrust of a passing train is relieved from the lever, that thus is restrained from chattering, and said thrust borne by parts which have a greater strength to resist it.

PROPULSION OF VESSELS.—Matthew K. Wildman, Brooklyn, N. Y.—*Dec.* 26.—This invention is designed more especially for boats or vessels, to be used on canals and other narrow waters, in which, among other objects to be gained, it is desirable to guard against the washing of the banks by the action of a propeller applied to the boat and worked by steam or other motive power. To this and other ends this invention consists of two reversely-pitched screw propellers, geared to rotate in opposite directions, one in front of the other, and so that the rear one revolves faster than the forward one, which prevents choking of the latter by back-water. The boat also has its rudder arranged within the rear end of the water-course or passage between the two longitudinally arranged hull sections, and is preferably constructed, so that it may be turned to wholly close the passage on either side of the boat, whereby increased facility is afforded for steering or turning the boat.

TURN-TABLE.—William S. Coulter, Ashley, Pa. —*Dec.* 26.—This invention relates to means for fastening the turn-table or device when adjusted into position with a line of rails, and consists in a bar or bars arranged on the outside of each rail of the table, and made capable of adjustment to release or hold the table as required.

TABLE FOR EMERY-GRINDERS.—James L. Jackson, New York City.—*Dec.* 26.—This invention relates more especially to tables for use in connection with what are known as, or may be termed, "face-grinders," the grinding faces of which coincide with the planes of revolution, such grinders being used as a substitute for planers in producing flat surfaces on cast-iron or other metal. The purpose of the table is to support and hold the work, and present it properly to the revolving face of the grinder. The table is composed mainly of a stationary horizontal shears, and a carriage travelling thereon. The invention consists in a novel construction of such carriage, and in novel appliances fitted thereto to afford convenience for holding different kinds of work, and in a novel system of anti-friction rollers, for supporting the carriage on the shears, whereby the inventor is enabled to use a carriage having a considerable amount of motion without making it and the shears of great length, and yet employ rollers of large size.

PRESSER-FOOT LIFTER FOR SEWING-MACHINES. —Theodore W. Kennedy, New York City.—*Dec.* 26.—This invention generally relates to sewing-machines in which the presser-foot has an up and down motion, in unison with the needle and timely relation to the feeder, as, for instance, in the Grover & Baker elastic stitch sewing-machine, to which this improvement is particularly applicable. The presser-foot lifter of such machines, as heretofore constructed, has been defective in the following respect, namely, they have been so formed or shaped that the presser-foot bar, in rising and falling, has produced a corresponding movement of the lifter, throwing it backwards and forwards each up and down movement of the presser-foot, thereby making considerable noise, besides, by its jumping motion in proximity to the work, being very annoying to the operator. This improved lifter obviates the above defect by being constructed with a straight face or edge, that serves as a back to the presser-foot bar, whereby it is both motionless and noiseless, so far as the action of said bar upon it is concerned. Said lifter is also provided with a tooth or shoulder arranged to rest against the presser-arm or frame, to keep the lifter from pitching forwards when the presser-foot is lifted by work of sufficient thickness to endanger such action.

DENTAL FORCEPS.—Peter N. Jacobus, Montague, N. Y.—*Dec.* 26.—This improvement in forceps for dentists' use consists in a cross handle to one or the main jaw, constructed to fit the palm of the hand, and designed to be held in position by the thumb and two lesser fingers, while the other fingers of the hand are employed in holding or operating the other jaw of the instrument, and is combined with a peculiar construction of the said lesser jaw, which is formed or provided with a cross piece and finger-guard, arranged to receive the two first fingers in between them. A dental forceps thus constructed or provided possesses many advantages over the forceps in ordinary use, being more easily or generally adaptable to different kinds of work, and capable of being manipulated with greater convenience and power.

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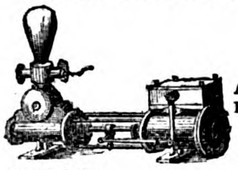

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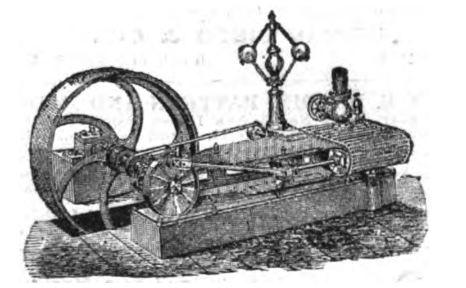

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AMERICAN ARTISAN.

A WEEKLY JOURNAL OF ARTS, MECHANICS, MANUFACTURES, ENGINEERING, CHEMISTRY, INVENTIONS, AND PATENTS.

VOLUME XIV. New Series. } NUMBER 2. NEW YORK, JANUARY 10, 1872. { $2 00 PER ANNUM IN ADVANCE. SINGLE COPIES, FIVE CENTS.

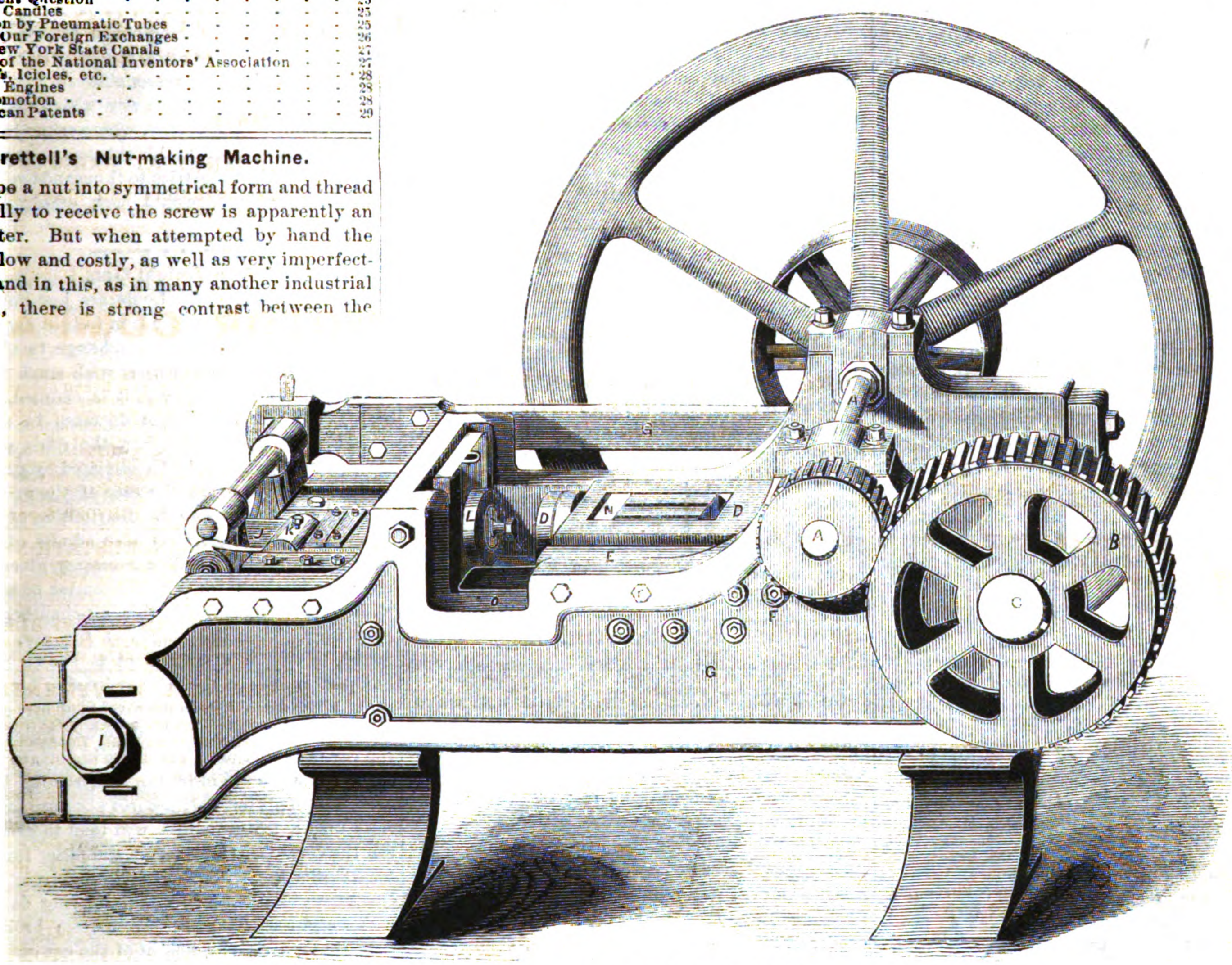
CONTENTS OF THIS NUMBER

[Illustrations are indicated by an asterisk.]

Brettell's Nut-making Machine.

To shape a nut into symmetrical form and thread it internally to receive the screw is apparently an easy matter. But when attempted by hand the work is slow and costly, as well as very imperfectly done, and in this, as in many another industrial operation, there is strong contrast between the clumsy manual methods of old times and the *modus operandi* and results of modern mechanism. We have no reason to suppose that American machinery for this purpose is, on the whole, inferior to that used abroad for the same purpose; but a machine that has met with the foreign favor claimed for that which we herewith illustrate is always well worthy of note, and must be of interest to all concerned, directly or indirectly, with the important branch of hardware production and traffic to which it relates. It is made by Messrs. P. & J. Brettell, Spon Works, Spon Lane, West Brunswick, London, who conduct the manufacture on an extensive scale, the machines being furnished by them to the Russian and some other governments who have adopted the same. The following descriptive sketch, having reference to the engraving, is from the London *Mechanics' Magazine*:—

"The framing of the machine is indicated at Y, and is fixed on iron legs, X; A is the driving-shaft, on which are fitted pulleys, fly-wheel, and pinion-wheel; from the latter is driven the spur-wheel, B; this spur-wheel is fixed on a massive wrought-iron shaft, C, to which is attached the bolt, D, by a connecting-rod working within the body of the machine, and is guided by checks, E, through which it slides, provision being made for wear by the setting-up pins, F. On the other end of shaft, C, is fixed a wheel-crank, imparting motion to the side-lever, G; this by means of a crank or rockshaft movement, and by means of the connecting-links, J, gives motion to the back bolt, K, in which is placed the punch. The bolster, L, is made to receive the back tool, M. In the front end of the bolt, D, is fixed a die-box, in which the nut is made. Another tool, the counterpart of M, is fitted into the movable tool-box, N; this receives and carries away the punchings. By a very simple contrivance the pressure on the nut may be increased or diminished in a moment, as required. The machine is fed through the gap, O, in the ordinary way. Above forty gross of first-class inch nuts can be completed daily by a single machine."



BRETTELL'S NUT-MAKING MACHINE.

ACORNS command a good price—$20 per tun—in Stockton, Cal., and quite a profitable business has been done by several parties gathering acorns and disposing of them at that price for feeding swine.

Diamond Powder.

In preparing diamond powder, some rough diamonds should be procured; that is to say, diamonds that have not been cut. Diamonds that have already been cut may also be used, but are supposed to be not so good for this purpose as those in the rough, because the latter are harder in consequence of retaining their crust. A karat is usually prepared at a time. Rough diamonds cost from 30 to 36 francs per karat: this price varies very often, and according to the dealers applied to. Diamonds with a darkish tint are the best; they should be selected in pieces as large as possible, so that four or five will make about a karat in weight.

The powder is obtained by pounding the diamond in the little mortar, but, before proceeding to this operation, one of the pieces is put into the mortar, the pestle placed upon it, and by a smart blow of a hammer on the pestle the diamond is broken; the pestle is then withdrawn, and the end by which the diamond has been broken examined. Sometimes fragments, or splinters of diamond, will adhere to it. If any are found, they are detached. The mortar is then inverted on a sheet of well-glossed black paper, and the fragments of diamond emptied on it. The larger pieces are looked over for such as may be suitable for gravers; those that are found are laid aside for mounting; those that are suited for drills are then selected from among the smaller fragments. They should be from half to a third of a millimetre in length, and as nearly triangular as possible. They are called splinters or needles of diamond. If the required number for gravers and drills is not found, the second piece of diamond is treated in the same manner; and so on to the last, in order to have a sufficient number of gravers and drills. This done, the other pieces of diamond are replaced in the mortar, and the pounding is commenced by striking on the head of the pestle with a hammer. This work is rather long, requiring two and a half to three consecutive hours. Care should be taken to turn the pestle from right to left in the mortar every time that six or eight strokes of the hammer have been given. Without this precaution pieces of diamond would be imbedded in the mortar and held there, which would prevent their being reduced to powder. When no longer any grinding is felt in turning the pestle, the diamond will be in suitable condition, and only have to be mixed with oil to be ready for use. The most limpid oil that can be procured should be used for this purpose; purified olive oil is the best. A large, deep watch-glass is filled with it, and the powdered diamond emptied into the oil. Often a portion of the powder will remain adhering to the bottom of the mortar. This should be loosened by scraping with a steel spatula, of which the end has the form of the inside of the mortar, and striking the mortar several times on the sides and under the bottom with a hammer. When satisfied that all the powder has been emptied into the glass, it is mixed with the oil, and divided as much as possible by pressing it against the sides of the glass with the spatula. When the mixture is completed, it is allowed to rest for one hour, and then decanted; that is, the oil containing the diamond is poured into a second watch-glass, taking care to leave in the bottom of the first the coarser particles of diamond that have settled. The oil and the diamond that have been poured into the second glass are allowed to rest four hours and then poured into a third glass, again taking care to leave behind the diamond that has settled at the bottom. It is then allowed to rest eight hours, and poured into a fourth glass. After resting sixteen hours it is poured into a fifth glass, and then left to rest several days. When all the powder has settled at the bottom of the glasses, and the oil become perfectly clear, the oil is decanted from all the glasses. When this operation is ended, the powder may be used, as has been described. It should not be neglected to number the glasses from one to five, in the order in which the diamond in them has been precipitated. Where it is desired to avoid the trouble of pulverizing the diamond, it may be bought in powder of dealers, but it is best to take the trouble to prepare it.—*Watchmaker and Jeweller.*

East Indian Road Material.

In India, the laterite or stony clay, of a cheese-like consistence, largely impregnated with iron, hardening to granite strength by exposure to the air, is largely employed for roads and in wet weather, or if kept watered, is as smooth as a billiard table, pleasant to drive on. But with dry weather and no water—water being a pearl beyond price in the thirsty East, hoarded in tanks for cultivation, jealously dispensed--these laterite roads powder down as if violently agitated on nutmeg-graters. The disintegrated dust, impalpable and omnipresent, fills the air, invades everything, while gulleys and ruts and yawning holes and cracks mysteriously appear everywhere, not to be mended, or the mending thought of, till after some rain. It has been proposed to use this laterite in the introduction of a peculiar porous material to be used as substitute for wood in paving.

The Opium Trade.

A recent report of the Bureau of Statistics gives a summary statement of the importations of opium and extracts of opium during the last two fiscal years. From this report it appears that during the twelve months ending June 30, 1871, there were imported into the United States 5,041,936 ounces of opium, worth $1,926,915 in gold, and that during the year ending June 30, 1870, there were imported 4,073,744 ounces, worth $1,776,908, making an increase of twenty-four per cent. in quantity and eight per cent. in value. According to the above figures, opium in 1870 was worth, at the custom-house, about seventy cents a pound, and in 1871 about sixty-one cents a pound, a decrease in price of thirteen per cent.

The Sunken Treasure of Cumana Bay.

On page 233, Vol. XII., of the American Artisan, we gave an account of the enterprise started last spring to recover the treasure sunk long ago in Cumana Bay in the *San Pedro de Alcantara.* The latest news from the scene of operations states that eight hundred Spanish milled dollars have been recovered as the first fruits of the enterprise. The bulk of the treasure has not yet been reached, but a large amount of preliminary work has been done, by breaking down the sides of the sunken vessel, exposing a mass of cannon, muskets, chains, etc., under which the treasure sought for is supposed to be.

New Notion for Paper.—A scheme is afloat amongst very influential Swedish proprietors, including Prince Oscar, to utilize the larch forests of the country in a new fashion by manufacturing paper out of timber. Machinery for the purpose has lately been procured in England.

President Gowan, of the Reading Railroad, Conn., receives $30,000 a year, the largest salary paid to any railroad officer in the country.

The Apprenticeship System.

We are glad to notice indications of a gradual change in the sentiments of the workingmen engaged in several of the principal branches of mechanical industry, on the subject of the restrictions now imposed by the trade-unions upon the admission of apprentices. No steps have been taken, so far as we know, to secure the repeal of the rules of the unions imposing these restrictions, but the workingmen generally are beginning to discover that such a policy can result in no possible benefit to them, while it gives rise to many and serious evils which affect unfavorably the well-being of society at large. We have frequently heard intelligent workingmen argue that, by enforcing such a rule, they were depriving their own sons of a fair chance in life, only to make room for foreign workingmen, who find, in the scarcity of skilled labor which such a system creates, the strongest inducement to emigrate to this country. These men cannot fail to see, also, that by closing the useful trades to the rising generation, the unions are encouraging idleness. The distributive industries are always overcrowded, and, where boys are denied opportunities to learn trades, it is inevitable that many must remain idle. Such a condition of affairs is highly favorable to the growth of vicious habits, and it is quite reasonable to believe that much of the juvenile depravity which now exists, especially in our large cities, where crime is greatly on the increase, is due to this ruinous system, which closes the useful industries to thousands who, were opportunity offered, would seek employment in them.—*Iron Age.*

Iron Freight Cars.

The merchants of St. Louis are just now much interested in a model of an iron freight car now on exhibition at the Produce Exchange in that city. This car, which is said to meet with much favor, is cylindrical in shape, giving, it is claimed, greater strength, without the least decrease in carrying capacity—the pressure against the sides, which in the square cars can only be obviated by great care in loading, tending in the case of the cylindrical iron car only to equalize the distribution of weight upon the floor. The form also admits of perfect ventilation, as the false floor necessary gives an air-chamber beneath, while the formation of the sides by double casing extends this air-chamber on all sides throughout the length of the car. In the model, a simple arrangement is shown by slides and perforations of the false or interior bottom and sides, whereby a constant current of air could be maintained through grain or other freight while the car is in motion. The most important feature, however, is the use of iron in construction in place of wood. This not only secures absolute immunity from fire, a feature which will tend to greatly lessen the cost of carrying cotton and other imflammable freights, but, while increasing the strength of the car some 15 per cent., and rendering damage to such freight as flour impossible from broken timbers, etc., reduces the weight of the car one ton; in other words, enabling the engine capable of hauling twenty loaded wooden cars of the present form to haul twenty-two with the same expenditure of power and wear and tear to road-bed and superstructure. This would result in a saving of at least 10 per cent. upon freight traffic, a consideration too important to be overlooked by practical railroad men.—*Exchange.*

Joss sticks, used altogether by the Chinese, bring an annual revenue of $23 40 to the United States Government.

Coal and Heat.

We are far from asserting that it is not a very desirable and useful thing to know, as nearly as may be, the extent of the national resources in the matter of coal, but we deem that this is the least important feature of the inquiry, and, for one reason, because it is not within the power of any man or body of men to increase the stock. Such and so much as it is, it will yield so long as the quantity holds out, and no more. It must be obvious, moreover, that the mere fact of the existence of beds of coal is nothing, apart from the physical conditions of its existence, namely, the position and dimensions, in respect of depth of coal, and depth below the surface, as affecting its accessibility, and the practicability of working the same ; to say nothing of the question of quality.

Regard should be had to the various uses to which coal is put when got, and the probability or otherwise of its being superseded for some of them ; and it is certain that the only really hopeful channel of inquiry is that which touches upon the better utilization of coal as fuel and for other purposes, with efficiency and economy.

We use, or rather we abuse, coal for purposes of warming and lighting our dwellings and dwelling-places, and we use and abuse it, in somewhat less degree, for the generation of motive power; and perhaps we may be said fairly to use it only for the purposes of smelting and refining metals.

The contiguity and association of beds of coal and ironstone is a natural feature that is of great and essential utility in the reduction of iron from the ore. With other metalliferous ores, that are not found in such close alliance with the fuel necessary for their reduction, it is found expedient and economical to bring the crude ores, being the smaller bulk, to the fuel, rather than carry the fuel to the ore. We need only remark in passing that though wood, or rather charcoal, is superior to coal for smelting purposes, yet the extinction of forests has led to its being superseded in general by the commoner fuel.

This use of coal is, above all others, the one wherein the maximum of useful effect is obtained from the heat stored up in the fuel, or rather from the combustion of its carbon. Next to it may be classed the employment of coal for the manufacture of illuminating-gas.

But whereas, for smelting purposes, coal has no rival, and cannot be supplanted, the same is not the case in regard to artificial lighting, for which purpose there are many other substances available, in a greater or less degree, so that coal is by no means to be regarded as the sole, the best, or even the cheapest source of light. Especially is this the case now that there is a probability of the cheap and efficient practical application of a compound of oxygen and hydrogen ; omitting all consideration of petroleum, paraffine, and other vegetable, animal, and mineral oils and fats.

Great and well merited as is the admiration and praise given to the steam-engine, it has long been beyond question that the development of mechanical power in the very best forms of steam-engine, by the generation of steam in a boiler, and the utilization of its expansive force, is conducted in a very wasteful manner, and it is admitted that, at the best, no greater proportion than one-eighth to one-tenth of the total mechanical energy due to the combustion of the fuel is utilized, the remainder, from seven-eighths to nine-tenths, being absolutely wasted and without effect.

But bad as this is, the matter is worse, and the waste is greater, in the use of coal for the warming of our houses, by combustion in open grates, or even in stoves. It is estimated that not more than one thirtieth part of the heat developed is fairly and efficiently utilized. The unconsumed carbon and gases pass into the air, with such results to its purity and density as have been lately evidenced by the fogs that for three weeks past have oppressed our lungs and darkened our streets, and that are always a distinguishing feature of this land, a by-word and a reproach. Here, then, is a wide field for research and invention.

Wanted a prime-mover to supersede the present steam-engine, either by the use of electro-magnetic force, petroleum, compressed air, or other agencies, by a better employment and application of steam itself, alone or in combination—and economize coal.

Wanted a method of illumination that shall supersede coal-gas, or, at least, economize its use—and economize coal.

Wanted a system of generating heat and applying the same to the warming of dwellings, and the cooking of food, that shall utilize at least a fair proportion of the heat developed by combustion, and not let the bulk thereof be dissipated wastefully—to the same end, the economy of coal.

When we have got so far as to make one tun of coal go as far and produce as much useful effect in the process of combustion, however applied, as, say on a moderate estimate, eight or ten tuns do now, then, or even simultaneously, the question of supply may assume an importance that it does not as yet possess, in comparison with that of efficient and economical utilization. Nothing can be more certain than that, if these stages of improvement are not voluntarily sought for and anticipated, they will at last be forced upon us as matters of necessity, in proportion as coal, through wasteful use, becomes scarce and dear. But with the improvements and economies desired, the bulk of the supply would remain to be devoted to the smelting and refining of metalliferous ores and metals, for which it is, and must remain, essential.—*Mechanics' Magazine.*

Southern Railway Items.

The Southern railroad companies which bought the railroad, material, and rolling-stock that the Government found itself in possession of at the close of the war, are paying their debts, and, on the whole, doing very well. The value of the property sold was $8,500,000. There were fifty roads involved in the transaction, and June 30, 1870, thirteen had paid up all their indebtedness, amounting, principal and interest, to $2,380,000. A year later, on June 1, 1871, over two million dollars more had been paid, leaving still due at that time $4,724,350. Considering the poverty of most of the companies and of the people of the South, this is doing very well indeed.

Belgian State Railways.—To meet the wants of the colliery proprietors in Belgium, and to appease the bitter complaints as to the scanty supply of rolling-stock, the Belgian Department of Public Works proposes to place 1,000 new 10-tun coal trucks upon the system. It is also proposed to purchase fifty-eight locomotives with tenders, and thirty tenders for locomotives furnished previously without tenders.

One of the pioneer tobacco raisers in Santa Clara County, Cal., had this year 20 acres of rich bottom land devoted to "Havana" and "Connecticut Seed Leaf," the latter yielding 2,000 pounds per acre. He is his own manufacturer, employs eight hands and turns out "smoking" and cigars.

Rewards of Science.

Honors seem to follow the great scientists who thirty years ago attacked the great problem of the correlation of forces, and who indeed obtained the first clear glimpse of that very important doctrine. Mr. Joule, after being admitted as member into nearly all the scientific societies of the world, was honored in 1870 by the presentation of the Royal Society's "Copley Medal." This is the highest token of the system of that eminent scientific association. The same honor was conferred last year upon Dr. Julius Robert Mayer, who certainly owes for this desired consummation a large debt of gratitude to the noble defence of his researches by Professor John Tyndall some nine years ago. And lastly in this illustrious trio we have Mr. William R. Grove, who has just been elevated to a puisne judgeship by her Majesty Queen Victoria. Mr. Grove is perhaps the first great man of science who has ever ascended to the seat of justice in England, and certainly if not the first he is the greatest who has achieved this distinction.

The French Match Tax.

A discontent that is national has been kindled in France by a proposition on the part of the Government to tax matches five per cent.—that is, ten cents on a thousand. The match manufacture sustains 25,000 French workmen. Seven millions of dollars of capital is invested in it. The manufacturers insist, that if the tax is laid, the consumption of matches will fall off three-fourths, and that five millions of dollars' worth of property will be rendered valueless, and over twenty thousand laborers thrown out of employment.

The Memphis Chamber of Commerce recently proposed to the St. Louis Chamber of Commerce a joint convention to prepare a plan of expenditure by the General Government to redeem the lowlands of the Mississippi; for the diversion of rivers by means of canals ; for the preservation of the navigability of the Ohio River ; for a canal from the Mississippi River to Lake Michigan, and a ship canal from New Orleans to the sea. In noticing this the Chicago *Tribune* suggests that as these several works would, in the aggregate, only involve the expenditure of $100,000,000, the same convention might include the completion of the steamboat canal from the Kanawha River to Richmond ; a like canal from Chattanooga to Savannah ; the improvement of the Platte River to make it navigable from its mouth to its source ; the purchase and enlargement of the Erie Canal, and a canal around the falls of the Upper Missouri. "When the Government goes into the river and canal business at all," says the *Tribune*, "it should go in largely, say to the extent of $500,000,000.

At the time the gold panic raged high in Bridgewater, Vt., all the saw and grist mills in the vicinity of the mines were purchased by gold companies and constructed into mills for crushing quartz rock ; but the gold speculation is played out, for the present at least, and the freshet of 1870 swept off the crushers, leaving excellent water privileges, and as the mountains are densely wooded with spruce and hemlock, it is hoped some enterprising persons will soon build the mills so much needed. —*New England Farmer.*

An ambitious scissors-grinder is perambulating New York City with an elegant two-story grinding-machine—in fact, a complete cutler's shop on wheels. His grinding-wheel is placed over the others, and when he works he sits in an arm-chair that is fastened at the rear of the machine.

Utah Mining Progress.

To the Pacific Railroad we are indebted for the present and prospective development of our mineral wealth. The amount of argentiferous lead ores in the Wasatch and Oquirrh Mountains is beyond all calculation, and it will take centuries to exhaust them. These ores could not have been profitably mined and reduced and marketed without railway transportation. Some of the richest chloride ores might have been worked at a profit under the old system of ox-team freighting; but here, as in all other mining countries, much the greater quantity of bullion produced comes from medium or low grade ores. The lead ores of this Territory carry a larger percentage of silver than any that have ever been seen elsewhere. There are mines in the Wasatch the ores of which will average 25 per cent. in lead and $200 per tun in silver, and these ores are found in immense masses. The Utah Southern Railroad is completed seventeen miles south from this city, and is graded several miles further. It is the intention of the company to continue the construction of the road with all possible speed until it reaches St. George, 400 miles south. This road will pierce the center, and render available for settlement and civilization the greatest mineral region on the continent. The production of silver in Utah will, within a half decade, only be limited by our facilities for reducing argentiferous ores.

Drilling Triangular Holes for Blasting.

A correspondent of the *English Mechanic* states that in the Cleveland (England) mining district it is now usual when boring for blasting purposes to make the holes of a triangular section, instead of circular, as in the conventional style, and to effect this the boring bar or jumper is partly turned on each side of its cutting alternately. No difficulty is experienced in boring the holes to this shape, and they are found more effective than round holes, the corners forming points at which the fracture of the material operated on appears to commence, the line of fracture usually forming a prolongation of the triangle. The holes averaged three feet six inches in depth, and are generally made in thirty or forty minutes. The powder charges vary from one to two pounds, according to circumstances.

Chicago to Omaha.

There are now three lines of railroad from Chicago to the beginning of the Union Pacific road at Omaha—the Chicago and Northwestern, the Rock Island, and the Burlington—each making about the same time and giving nearly similar accommodations. They do not run in opposition to each other, but by agreement make a division of their receipts from through travel. They also take turns in running a train through on Sundays, so as to insure a daily mail to the Rocky Mountains and Pacific coast.

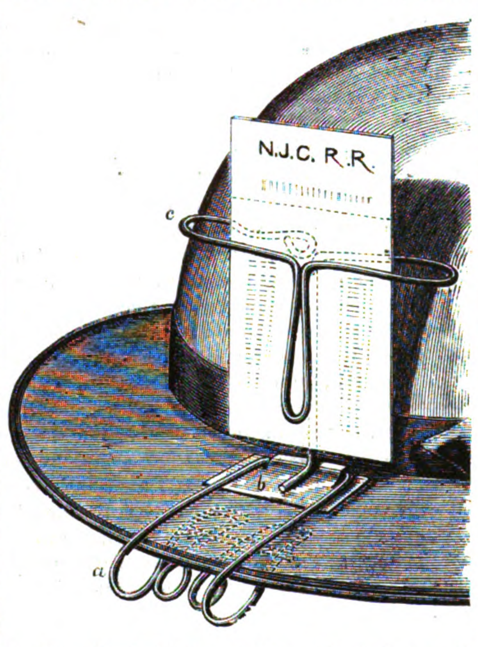
A tourist traveling continuously without any stoppage can now go around the world in eighty days, making the entire journey by railway and steamship, and going by way of Liverpool, the Suez Canal, Ceylon, Singapore, Hong Kong, Yokohama, San Francisco, and the Pacific Railway.

The distilleries of the United States can turn out 200,000,000 gallons of spirits per year, and we have now on hand 40,000,000 gallons. But even this is not enough, since we imported last year 620,078 gallons of foreign spirits.

SHIRTS'S PATENT TICKET-HOLDER FOR TRAVELERS.

They who travel much by rail will testify to the convenience of having the railway ticket prominently displayed, so that the conductor may put them and himself to as little trouble as possible in the discharge of his duty; also, that the hat-band, commonly used for holding the ticket, is an unreliable device, likely at any time to let go of the bit of pasteboard intrusted to its keeping. Aware of this, Mr. Peter J. Shirts, of Highland Falls, N. Y., has invented the traveler's ticket-holder illustrated in the accompanying engraving, on which, through the "American Artisan Patent Agency," a patent was allowed Nov. 27, 1871.

A brief description only is required to show, in connection with the engraving, the character and method of using the device. A wire-spring, *a*, is so formed as to, when the device is in use, secure-



ly clasp the hat-brim, and has pivoted upon its inner end a plate, *b*, which lies flat upon the brim, and has fixed thereto the upright wire-clasp, *c*, into which the ticket is thrust and firmly held in place. When not required for use, the device is removed, and the part, *c*, is turned down upon the part, *a*, which is allowed by the pivotal connection of the plate, *b*, with the inner end of plate, *a*. The whole thus forms a simple, convenient, and easily adjusted device for displaying the ticket prominently upon the hat without danger of loss, such as is liable to occur when it is simply stuck in the hat-band.

LOCOMOTIVE PROPORTION.*

To proportion locomotives so as to get the best and most economical service with the least expenditure of money and material, is a problem which has engaged the earnest attention of nearly all railroad engineers, from George Stephenson's time to the present day. Aside from the mere mechanical appliances, there are more elements which must be taken into consideration than at first sight appear. To a very great extent the questions which arise are those which refer to the proportion and relation of parts to each other, and it will be found that this mutual dependence is much closer than is ordinarily supposed.

In the first place, the total weight upon the driving-wheels must be governed by the loads to be drawn, and the grades to be overcome. Secondly, the weight on each wheel will be limited to a great extent by the weight of the rails with which the road is laid. Thirdly, the diameter of the wheels will depend upon the speed. Fourthly, the size of the cylinders will be governed by the diameter of the driving-wheels and the weight they carry. Fifthly, the capacity of the boiler will be dependent upon the size of the cylinders in relation to the driving-wheels and to the speed of the train.

In the proportion of these parts the most diverse practice exists. What is proposed in this paper is to show what are conceived to be the reasons which should govern the proportion of the parts referred to.

An an illustration, we will suppose that we have a road with grades of thirty feet per mile, and that we want locomotives to take 30 ordinary loaded box-cars up such grades. Taking the weight of the cars and the tender at 40,000 pounds each, we have a total load of 1,240,000 pounds, or 553½ tuns (of 2,240 pounds). Taking the train resistance on a level and straight line at 6½ pounds per tun, and adding it to the resistance due to gravity, we have a total of 19¼ pounds per tun, or 10,655 pounds. If, now, we assume that the adhesion of the engine will be 600 pounds for each tun it carries, we will require 17¾ tuns, or 39,760 pounds, adhesive weight on the drivers to do the work proposed. For the sake of even figures we will call it 40,000 pounds, which is about the weight that is carried on the four driving-wheels of ordinary American locomotives, whose total weight is 60,000 pounds. Such engines are usually provided with wheels 61½ inches in diameter and 16x24-inch cylinders, and we will assume this to be the best proportion.

If, now, we divide the number of cubic inches contained in the spaces swept by the two pistons (equal to four times that of one cylinder) during one revolution of the driving-wheels by the circumference of the latter in inches, we will have the amount of steam expended for each inch that the locomotive is propelled by the revolution of the wheels when they do not slip. The cubical contents of a cylinder of 16 inches in diameter and 24 inches stroke equal 4,825 inches. As each piston sweeps through the cylinder twice for every revolution, the steam consumed is four times 4,825, or 19,300 inches, which divided by the circumference of the driving-wheels, or 193·2 inches, will give, within a very small fraction, 100 cubic inches of cylinder capacity for each inch of the circumference of the driving-wheels. In order to designate this quantity, we have ventured to name it the modulus of propulsion. It is thought that it furnishes the most accurate expression for the cylinder capacity of locomotives, as it takes into account all the dimensions of both the cylinders and wheels, and shows at a glance the exact relation of the capacity of the one to the other. If the driving-wheels were 55½ inches in diameter instead of 61½, the cylinder capacity would be 110·7, or more than ten per cent. greater than in the other case. The cylinder capacity of engines with 50-inch driving-wheels and 15x22-inch cylinders is as great as that of engines with 61½-inch wheels and 16x24-inch cylinders. Of course, if the weight on the driving-wheels is increased or diminished, the cylinder capacity should be changed in the same proportion. To maintain the proportion indicated by the preceding considerations, the following rule has been constructed:—"Multiply the total weight on the driving-wheels in tuns (of 2,000 pounds) by 5, and then by the circumference of the wheels in

* Paper by M. N. Forney, Mechanical Engineer, read before the Civil Engineers' Club of the Northwest, Dec. 11, 1871.

inches, and divide by 4. The result will be the capacity in cubic inches of each cylinder." Knowing this, it is of course easy to deduce the diameter from the stroke, or *vice versâ*.

Having determined from ordinary practice what proportion the size of the cylinders should bear to that of the driving-wheels and the weight they carry, let us now consider the proportion the boiler capacity should bear to that of the cylinder, or rather to the modulus of propulsion. It is hardly necessary to say to my hearers that the amount of steam generated in proportion to the heating surface is much greater in locomotive boilers than in any other kind. To produce combustion which will be sufficiently active to generate the requisite quantity of steam, the fire must be stimulated by the blast created by the exhaust steam to a degree unknown in almost any other kind of boilers. So rapid is the movement of the products of combustion that a smaller proportion of the heat is imparted to the water contained in the boiler, and consequently a less amount of water is evaporated in proportion to any given amount of fuel, than in boilers in which combustion is less violent. The combustion is also less perfect, because the strong draught does not allow time for a perfect combination of the gases which produce combustion. Now, the smaller the boiler, or rather the larger the amount of steam which must be generated in a given time in proportion to the heating surface, the more must the fire be urged; and, therefore, the smaller the boiler in proportion to the work it must do, the less will be its economy. In order to produce a rapid combustion in a small boiler, it is necessary to contract the exhaust nozzles in order to create a draught strong enough. In doing this the back pressure on the pistons is very much increased, and, when the blast becomes very violent, large quantities of solid coal are carried through the tubes and escape at the smoke-stack unconsumed. At the same time large quantities of unconsumed gases escape, because there is not time for combustion to take place in the fire-box. The fact that with a violent draught the flame and smoke are in contact with the heating surface for a sensibly shorter period of time also has its influence; as less heat will be imparted to the water if the products of combustion are only $\frac{1}{100}$ of a second instead of $\frac{2}{100}$ in passing through the tubes.

There is another consideration which should be taken into account in this connection, which is, that if a boiler is so small that it is worked nearly up to its maximum capacity at all times, it will be impossible to accumulate any reserve power in it in the form of water heated to a high temperature to be used as occasion may require. With a boiler having a great amount of heating surface and capacity for carrying a large quantity of water, the latter can be heated at times when the engine is not working hard, and the surplus used when it is most needed. We will suppose that to pull a train of 30 cars on a level we must evaporate 250 pounds of water per mile. On a grade of 30 feet per mile the resistance will be three times what it is on a level; therefore the boiler must evaporate 750 pounds of water per mile on the grade in order to pull the train. If, now, we have a boiler with capacity for carrying a very large quantity of water, we can heat 500 pounds per hour on the level, 250 of which will not be needed. This can gradually be accumulated, so that after running four miles on a level the boiler will have 1,000 pounds of surplus hot water. If, now, on going up the grade the same amount of water is evaporated that was heated on the level, and 250 pounds of the surplus be used, the boiler will be doing no more work on the grade than it did on the level, although three times the quantity of steam is used. If, on the contrary, the boiler is so small that little or no surplus heated water can be accumulated, then we can heat water only as the steam is used, or at the rate of only 250 pounds of water per mile on a level, and therefore must evaporate 750 pounds per mile on the grade.

Or, in other words, with the smaller boiler, we must evaporate more water per mile on the grade than with the larger one. To do so it must be forced up to its fullest capacity, and the fire stimulated to such a degree that great waste will result from the imperfect combustion of coal and smoke, and loss from back pressure caused by contracting the exhaust in order to produce a blast strong enough. We are therefore led to the conclusion that the larger the boiler, the more economical will be its performance—an inference fully sustained by practice. In proportioning locomotives, it is important to bear this fact in mind, especially when any attempt is made to reduce their dead-weight.

We have shown that to pull a given load a certain amount of adhesion is requisite. From existing practice we have deduced the cylinder capacity, or what we have called the modulus of propulsion, which should be supplied for any given weight in the driving-wheels. Now, if existing practice is right in this matter, the considerations which have been given will determine the cylinder capacity in any given case. We assume that this is right, and regard any discussion of it as foreign to our present inquiry, and on that assumption we draw the inference—based upon the present practice—that any greater amount of adhesion or weight on the driving-wheels in proportion to the cylinder capacity is not desirable. It is not assumed that the proportion of cylinder capacity to the amount of weight on the driving-wheels is not a suitable subject for consideration, but only that, before it can be shown to be true of a style of engine different from that in ordinary use, it must first be shown that our present practice is wrong. The element of speed is also for the present left out of the discussion, and what is said relates only to such engines as are used for ordinary freight traffic.

It has also been shown that the larger the boiler capacity, the more economical will be its working. With these principles as premises, let us see what are the limitations in the way of a reduction of dead-weight; and before it is assumed—as it often is—that it is desirable to carry the whole weight of the boiler, engines, fuel, and water on the driving-wheels, let us find out what will be the result if we do so.

Taking the best American locomotives, with 16x24-inch cylinders, and what are called 5-feet driving-wheels, we find they have boilers with about 1,000 square feet of heating surface. Such a boiler with all its attachments, including safety-valves, whistle-cocks, gauges, steam-pipes, throttle-valves, smoke-stack, grates, ash-pan, and lagging, weighs, full of water, about 25,000 pounds. The other parts of the engine, including all the machinery, but excluding the truck, weighs 30,000 pounds. The tank alone will weigh 3,500 pounds, 1,800 gallons of water will weigh 15,000 pounds, to which add 6,000 pounds of coal and the weight of two men, and tools, etc., which we will call 500 pounds, and we have:—

Boiler	25,000	lbs
Engine and machinery	30,000	"
Tank	3,500	"
Water	15,000	"
Coal	6,000	"
Men and tools	500	"
Or a total of	80,000	"

—which is just double the amount of adhesion which, as ordinary practice indicates, can be operated to advantage with the modulus of propulsion and the boiler capacity at present used. If 10,000 pounds is the maximum load which can or should be carried on one wheel, then eight wheels is the smallest number on which the weight of our engine can be carried. It may be said with some truth that the weight of some of the parts could be materially reduced without lessening their strength or efficiency. Let us see how much reduction could be made.

The boiler might, perhaps, with improved design and material be reduced 20 per cent., or 5,000 pounds, and still retain the same amount of heating surface and water capacity. By using smaller driving-wheels, the cylinders, with the same modulus of propulsion, would be of smaller size: consequently they, as well as the wheels, connections, frames, and in fact all the other parts of the machinery, could be reduced in size, and yet have the same tractive power, and relatively equal strength. We will suppose this reduction to amount to as much as one-third of the weight of the engines and machinery. We would thus save 10,000 pounds. Neither the weight of tank, water, nor coal can be lessened without using the arrangement for taking up water while running, which, it is thought, none of my hearers would regard as practicable in any but very exceptional cases. No way, excepting Banting's system for reducing corpulency, is known by which the weight of the locomotive runner and fireman can be lessened.

With a liberal estimate, therefore, the only reduction which it seems possible to make will be 5,000 pounds in the boiler and 10,000 in the machinery, which would reduce the total weight to 65,000 pounds, which is still 25,000 pounds greater than the requisite amount of adhesion which, as practice has indicated, can be utilized to advantage with the sizes of cylinders and boilers we are considering. Our conclusion, therefore, is that, with the materials now in use and the present knowledge of the construction of the machinery of locomotive engines, it is impracticable to carry the whole weight of the machine, including fuel and water, on the driving-wheels, unless our present practice is wrong, and less cylinder and boiler capacity in proportion to the adhesive weight is desirable.

Accidental Death of an Inventor.—The Mode of his Identification.

On Dec. 27, George W. Bliss, of Brooklyn, N.Y., was accidentally run over and killed by a train on the Delaware Railroad, at Middletown, New Castle County, Del. The only clue which presented itself, through which to make his death known to his family and enable them to obtain his body, was a patent which not long before had been granted to him, and which was found on his person after his death. The coroner of New Castle County wrote to Brown, Coombs & Co., of the "American Artisan Patent Agency," and one of the members of that firm proceeded to Brooklyn, and sought out and found the family of the deceased, two of whose brothers proceeded to Delaware, and by means of the coroner's letter established their relationship to the deceased, whose remains they brought home for interment in the family burial plot.

Before the war Alabama had about four hundred miles of very poor railroad; now she has more than a thousand, much of it excellent.

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AND EACH BEARING THAT DATE.

[Reported officially for the "American Artisan."]

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122,304.—CAR-COUPLING.—John W. Allen and Edgar C. Boyles, Mount Pleasant, Iowa. Ante-dated December 16, 1871.
122,305.—FRUIT-PARING MACHINE.—Asahel G. Batchelder, Lowell, Mass.
122,306.—PROCESS FOR CLEANING COFFEE.—William H. Butler, Chicago, Ill.
122,307.—MACHINE FOR PUNCHING AND SWAGING COTTON-GIN SAW-TEETH.—Jefferson M. Clough, Ilion, N. Y.
122,308.—PIPE-TONGS.—William H. Downing, assignor of one-half his right to Peter Morris, Shamburg, Pa.
122,309.—APPARATUS FOR RAISING COAL FROM SUNKEN VESSELS.—Rees W. Dugan, Cairo, Ill.
122,310.—CASTING INGOTS.—Zoheth S. Durfee, New York City.
122,311.—GAS-GENERATING APPARATUS.—Zoheth S. Durfee, New York City. Ante-dated December 16, 1871.
122,312.—MANUFACTURE OF IRON AND STEEL.—Zoheth S. Durfee, New York City. Ante-dated December 16, 1871.
122,313.—CIRCULAR-SAW MILLS.—Philip Etches and James D. Wilson, Muskegon, Mich.
122,314.—PAPER-FILE.—Jeremiah W. Foard, San Francisco, Cal. Ante-dated December 20, 1871.
122,315.—BUCKLE.—Nathaniel D. Fowler, Valley Ford, Cal.
122,316.—DOOR-SPRING.—Francis Gardner, Boston, Mass.
122,317.—TOY.—Alexander W. Hall, Charles F. Ritchel, and Samuel Loyd, assignors to Samuel Loyd, New York City. Ante-dated December 16, 1871.
122,318.—MOUSE-TRAP.—George L. Hart, New Britain, Conn.
122,319.—OPERATING RAILWAY SWITCH.—James M. Hickman, Richmond, Ind., and Henry Staufer, Cincinnati, Ohio.
122,320.—SAW.—John Huther, Cleveland, Ohio.
122,321.—WOOD-MOLDING MACHINE.—Nicholas Jenkins, New Haven, Conn. Ante-dated December 14, 1871.
122,322.—HUB FOR CARRIAGE-WHEELS.—Jacob Kritch, Cleveland, Ohio.
122,323.—HUB FOR CARRIAGE-WHEELS.—Jacob Kritch, Cleveland, Ohio.
122,324.—NAIL-CUTTING MACHINE.—Thomas M. Laurence, Piqua, Ohio.
122,325.—SPRING BED-BOTTOM.—Goodrich Lightfoot, Elgin, Ill.
122,326.—STEAM-HEATER FOR RAILROAD-CARS.—Charles A. Mable, Truman H. Whitcomb, and John T. Brown, Albion, N. Y.
122,327.—RAILWAY SWITCH.—William H. Masterman and Andrew Jackson, Stockton, Cal.
122,328.—EAR-RING.—Louis L. Northup, Olneyville, R. I.
122,329.—SCOURING-CASE FOR SMUT MACHINES AND HULLERS.—Nathan C. Page, Washington, D. C.
122,330.—GRAIN-SCOURER AND CLEANER.—Austin B. Paige, Washington, D. C.
122,331.—WASHING MACHINE.—Ara Paine, Burrillville, R. I.
122,332.—STEAM WATER-ELEVATOR.—Giles Bolivar Roe, Payne's Point, Ill. Ante-dated December 29, 1871.
122,333.—SHEARS.—Ferdinand Schoettle, Philadelphia, Pa.
122,334.—DEVICE FOR STEADYING WAGON-POLES.—Reuben Austen Seaders, San Francisco, Cal.
122,335.—HOLDER FOR SPINNING-RINGS.—Samuel S. Shorey, assignor to George Draper & Son, Hopedale, Mass.
122,336.—SHAWL OR OTHER DRESS-PIN.—Henry C. Strong, Lansing, Iowa.
122,337.—CABINET WASH-STAND.—Niles H. Thompson, Albion, Mich.
122,338.—LAST.—John C. Toot, Clearfield, Pa. Ante-dated Dec. 16, 1871.
122,339.—BENCH-PLANE.—Charles E. Torrance, Holyoke, Mass.
122,340.—CAR-WHEEL.—Frederick W. Townrow, United States Navy.
122,341.—COTTON-SEED HULLER.—William H. Trott, David R. Torbett, and Frederick A. Pomeroy, Columbus, Ga.
122,342.—POWER ROCK-DRILL.—Frank Walts and Dexter Mills, Watertown, N. Y.
122,343.—PIANO-PEDAL STOOL.—Joel Henry Wells, Chicago, Ill.
122,344.—EXCAVATOR.—George W. Williams, assignor to Edgar Hill, Corning, N. Y.
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122,350.—PROTECTING BUILDINGS FROM FIRE.—William D. Baker, East Abington, Mass.
122,351.—CANAL-BOAT.—Edward C. Bancroft, Syracuse, N. Y.
122,352.—TUCK-CREASER FOR SEWING-MACHINES.—William E. Barnum, assignor to Herman B. Goodrich, Chicago, Ill.
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122,360.—BASE-BURNING STEAM GENERATOR.—Alfred Catchpole, Geneva, N. Y.
122,361.—LUBRICATOR.—William A. Clark, Westville, Conn.
122,362.—COP-TUBE AND MACHINE FOR MAKING IT.—John E. Coffin, Portland, Maine. Ante-dated Dec. 13, 1871.
122,363.—CARRIAGE-HUB AND AXLE.—Lyman D. Cooke, West Liberty, Ohio. Ante-dated Dec. 27, 1871.
122,364.—TRACE-CARRIER FOR HARNESS.—Edward A. Cooper, Lancaster, N. Y.
122,365.—FURNACE FOR STEAM-GENERATORS.—William F. Cox, Philadelphia, Pa.
122,366.—EYELETING MACHINE.—Oliver G. Critchett, Stoneham, assignor to Henry Kimer Townsend, Boston, Mass.
122,367.—BALANCING MILLSTONE.—Seneca Culver, Sandwich, Ill.
122,368.—CAR-COUPLING.—Alexander H. S. Davis, Farmington, Maine.
122,369.—MILLSTONE DRESS.—Edmund Deer, Annapolis, Ind.
122,370.—ADJUSTABLE UMBRELLA-HOLDER FOR CARRIAGES.—William C. Doolittle, Marion, Conn.
122,371.—MANUFACTURE OF SUGAR.—George A. Drummond and Thomas Sterry Hunt, Montreal, Canada.
122,372.—ROOFING.—Melvin J. Earl, Mansville, assignor to Polly M. Earl, Ellisburg, N. Y. Ante-dated Dec. 23, 1871.
122,373.—WHEEL-CULTIVATOR.—Nathan Earlywine, Centerville, Iowa, assignor to himself and Charles A. Davis, St. Louis, Mo.
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122,382.—ARGAND GAS-BURNER.—Hiram W. Hayden, assignor to Holmes, Booth & Haydens, Waterbury, Conn. Ante-dated Dec. 19, 1871.
122,383.—BRIDLE-BIT.—Nahum Hayward, Roanoke, Ind. Ante-dated Dec. 23, 1871.
122,384.—COOLER FOR WATER, ETC.—George A. Higgins, New York City. Ante-dated Dec. 16, 1871.
122,385.—MACHINE FOR HEADING BOLTS.—Charles E. Hunter, Hinsdale, N. H.
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122,463.—CANAL-BOAT.—Charles W. Hermance, Schuylersville, N. Y.
122,464.—CHEESE-HOOP.—Ezra Hodgkins, Carthage, N. Y. Ante-dated Jan. 1, 1872.
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122,466.—COMBINED SHEAR AND BOLT-CUTTER.—George A. Howe, Niles, Mich. Ante-dated Dec. 21, 1871.
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122,468.—NAIL-BUTTON.—Edmund Kolben, New York City.
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122,470.—BREECH-LOADING FIREARM.—James Lee, Milwaukee, Wis., assignor to E. Remington & Sons, Ilion, N. Y.
122,471.—SPOKE AND WHEEL FOR VEHICLES.—William Arnold Lewis, Chicago, Ill.
122,472.—MAT FOR BIRD-CAGES.—Otto Lindemann, New York City.
122,473.—AUTOMATIC TELEGRAPH INSTRUMENT.—George Little, Rutherford Park, N. J.
122,474.—TELEGRAPH APPARATUS.—George Little, Rutherford Park, N. J.
122,475.—PUMP.—John H. McGowan, Cincinnati, Ohio.
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122,478.—MANUFACTURE OF EFFERVESCENT DRINKS FROM FRUITS.—Antonio Meucci, Clifton, assignor to Alexander McAndrew, Tode Hill, N. Y.

122,479.—COMBINED CORN-STALK CUTTER AND CULTIVATOR.—Samuel T. Miller, Empire Prairie, Mo.

122,480.—CAR-COUPLING.—Robert B. Morris, Harrisonville, Mo.

122,481.—TRACK-LIFTER.—John Morton, Cincinnati, Ohio.

122,482.—METALLIC PIPE OR TUBING.—Peter Naylor, New York City.

122,483.—COTTON AND HAY PRESS.—John L. Nelson, Greenville, N. C.

122,484.—MECHANICAL MOVEMENT FOR OPERATING THROTTLE-VALVES.—Ezra Nicholson, assignor of two-thirds his right to Charles B. Stilwell and John J. Clause, Cleveland, Ohio.

122,485.—SIEVE FOR THRASHING AND SEPARATING MACHINES.—Thomas Nicholson, Titusville, Pa.

122,486.—VACUUM APPARATUS FOR TREATING DISEASES.—Sardius Pasco, Delavan, Wis.

122,487.—COMBINED HAY-TEDDER AND RAKE.—Stuart Perry, Newport, N. Y.

122,488.—HORSE-POWER JACK.—Stuart Perry, Newport, N. Y.

122,489.—FIRE-EXTINGUISHER FOR STEAM-BOILERS.—William E. Prall, Washington, D. C.

122,490.—NEEDLE-SETTER FOR SEWING-MACHINES.—William Raeuchle, Philadelphia, Pa.

122,491.—CHECK-REIN.—Richard B. Robbins, Adrian, Mich.

122,492.—HARVESTER.—Albert M. Ross, Ilion, N. Y.

122,493.—ELECTRO-MAGNETIC SEPARATOR.—Alexander Ross, Montreal, Canada.

122,494.—STOP-VALVE.—Edmund Russell, Brooklyn, N. Y.

122,495.—CAR-AXLE LUBRICATOR.—John S. Sanson, Morrisania, N. Y.

122,496.—SASH-HOLDER.—Charles C. Shepherd, Passaic, N. J.

122,497.—CONCRETE PAVEMENT.—William Harrold Smith, New York City.

122,498.—MANUFACTURE OF CONCRETE PAVEMENTS, AND MACHINERY FOR THE SAME.—William Harrold Smith, New York City.

122,499.—GAS-GENERATOR.—Chase A. Stevens, New York City.

122,500.—RUBBING APPARATUS FOR MEDICAL PURPOSES.—Geo. H. Taylor, New York City.

122,501.—HARVESTER.—Henry C. Velle, Poughkeepsie, N. Y.

122,502.—MECHANICAL MOVEMENT.—Alexander Wallace, Jacksonville, assignor of one-half his right to Leonard R. Turner, Fernandina, Fla.

122,503.—DIRT-SCRAPER.—Harmon Warren, Fairfax, Vt.

122,504.—CARTRIDGE.—Charles S. Wells, Springfield, Mass.

122,505.—ROTARY CHURN-DASHER.—Harvey L. Wells, Oquawka, Ill.

122,506.—ATTACHING HUBS TO AXLES.—William L. Williams, New York City.

122,507.—MEDICAL COMPOUND OR WORM CANDY.—John C. Wills, Owingsville, Ky.

122,508.—CIDER MILL.—Daniel T. Willson, Harrisburg, Pa.

122,509.—CAR-COUPLING.—George Worden, Pittston, Pa.

RE-ISSUES.

4,687.—HAND CORN-HUSKER.—Alexander W. Brinkerhoff, Upper Sandusky, Ohio. Patent No. 36,333, dated Sept. 2, 1862.

4,688.—SELF-ACTING JACK FOR SPINNING.—William H. Brothers, Hartland, Vt., assignor, by mesne-assignments, to Benjamin S. Grant, Boston, Mass. Patent No. 94,278, dated Aug. 31, 1869.

4,689.—ROASTER FOR NUTS.—D'Alembert T. Gale, Poughkeepsie, N. Y. Patent No. 81,159, dated Aug. 18, 1868.

4,690.—STEAM-GENERATOR.—John B. Root, assignor, by mesne-assignments, of one-third interest to Thomas C. M. Paton, New York City. Patent No. 74,146, dated Feb. 4, 1868; re-issue No. 4,082, dated July 26, 1870.

4,691.—TUYERE.—Samuel Williamson, Cincinnati, Ohio. Patent No. 118,321, dated Aug. 22, 1871.

4,692.—MANUFACTURE OF STEEL FOR TOOLS, CUTLERY, ETC.—Thomas Brooks, assignor, by mesne-assignments, to himself, Thomas Jackson, Frank A. Foster, and Cornelius Aultman, Minerva, Ohio. Patent No. 118,100, dated Aug. 15, 1871.

4,693.—HEMMER FOR SEWING-MACHINES.—John V. D. Eldredge, Detroit, Mich., assignor to Charles A. Shaw, Biddeford, Maine, and H. W. Boardman, Lowell, Mass. Patent No. 107,889, dated Oct. 4, 1870.

4,694.—MODE OF STRENGTHENING THE ANGLES OF BENT METALLIC BARS.—Charles F. Hawley, Kansas City, Mo. Patent No. 115,851, dated June 13, 1871.

4,695.—DAMPER FOR HOT-AIR FURNACES.—Albert H. Mershon, Philadelphia, Pa.—Patent No. 77,512, dated May 5, 1868.

4,696.—LOCK.—James Sargent, Rochester, N. Y.—Patent No. 57,574, dated August 28, 1866.

4,697.—TRUSS.—Jacob A. Sherman, New York City.—Patent No. 55,724, dated June 19, 1866.

4,698.—WINDOW-SCREEN.—The Adjustable Window-screen Company, assignee, by mesne assignments, of Abner B. Magoun, Philadelphia, Pa.—Patent No. 52,726, dated February 20, 1866.

4,699.—HARNESS SADDLE-TREE.—Samuel E. Tompkins, Sing Sing, N. Y., and John Maclure, Newark, N. J., assignors to Samuel E. Tompkins.—Patent No. 22,841, dated Feb. 1, 1859.

4,700.—HAND-TRUCK.—Beckwith W. Tuthill, New York City.—Patent No. 94,673, dated September 7, 1869.

4,701.—BRUSH.—Albert M. White, Port Chester, N. Y., assignor by mesne assignments, to The American Brush Company, New Haven, Conn.—Patent No. 47,157, dated April 4, 1865.

4,702.—CAR-WHEEL.—John Raddin, Lynn, Mass.—Patent No. 64,796, dated May 14, 1867.

DESIGNS.

5,452.—STOVE-PLATE.—Philo D. Beckwith, Dowagiac, Mich.

5,453.—HEATING-STOVE.—Philo D. Beckwith, Dowagiac, Mich.

5,454.—FIRE-POT OF A COAL-STOVE.—Philo D. Beckwith, Dowagiac, Mich.

5,455.—BLACKBOARD.—Malcolm McVicar, Potsdam, N. Y.

5,456.—TYPE.—Richard Smith, assignor to MacKellar, Smiths & Jordan, Philadelphia, Pa.

5,457.—FRAME FOR A MIRROR.—William G. Cross, assignor to Hall & Garrison, Philadelphia, Pa.

5,458 to 5,460.—TRIMMING.—Frederick A. Kursheedt, New York City.

5,461.—SHOW-CASE.—William H. Reiff, Philadelphia, Pa.

TRADE-MARKS.

608.—COFFEE-POT.—John Ashcroft, Brooklyn, N. Y.

609.—PERFUMES, SOAPS, ETC.—Deniker & Melville, New York City.

610.—BOOTS AND SHOES.—Hosea B. Edgerly, Farmington, N. H.

611.—MEDICINE.—H. G. G. Fink, Pittsburg, Pa.

612.—BIBLES.—Andrew J. Holman, Philadelphia, Pa.

613.—SHIRTS.—Miller & Brother, Philadelphia, Pa.

614.—SUBSTITUTE FOR LINSEED-OIL, ETC.—E. Murdock, Jun., Winchendon, Mass.

615.—DRESSING FOR LEATHER.—Elihu B. Palmer, Boston, Mass.

616.—GIN.—Seth E. Pecker & Co., Boston, Mass.

617.—OIL OR SOAP.—J. M. Rall & Co., St. Louis, Mo.

618.—SPICED SALMON.—Isaac Rich & Co., Boston, Mass.

619.—WROUGHT-IRON GOODS.—J. Rogers, Jay and Au Sable Forks, and J. Rogers, Black Brook, N. Y.

620.—WINES AND LIQUORS.—E. Simpson & Co., New York City.

621.—ARTISTS' MATERIALS.—Charles P. Staab, New York City.

622.—PASTILLES.—Stowell & Co., Charlestown, Mass.

623.—WHEAT.—James E. Weaver, Havelock, Pa.

624 to 635.—STOVES.—William J. Keep, Troy, N. Y.

APPLICATIONS FOR EXTENSION.

OPPONENTS of extensions must file *written* objections in the Patent Office at least 20 days before the day-of-hearing; and on the Patent Office, and state the reasons of their opposition. All testimony—*pro* or *con*—must be taken and transmitted in accordance with the official rules, which will be furnished on application. The under-named patentees have recently petitioned for extensions (for seven years) of patents granted to them in the year 1858:—

HARRIET L. LOW, Administratrix of HENRY L. LOW, deceased, Galena, Ill.—*Sewing-machine*.—Patented March 16, 1858; testimony will close on Feb. 13, next; last day for filing arguments and examiner's report, Feb. 23; day-of-hearing, Feb. 28.

WILLIAM SELLERS, Philadelphia, Pa.—*Turning and Sliding Table for Railroads*.—Patented March 23, 1858; reissued August 10, 1858; testimony will close on Feb. 20, next; last day for filing arguments and examiner's report, March 1; day-of-hearing, March 6.

HYMEN L. LIPMAN, Philadelphia, Pa.—*Combination of Lead-pencil and Eraser*.—Patented March 30, 1858; testimony will close on Feb. 27, next; last day for filing arguments and examiner's report, March 8; day-of-hearing, March 13.

PETER V. MATHEWS, Philadelphia, Pa.—*Mode of protecting Gilding on Glass*.—Patented April 27, 1858; testimony will close on March 26, next; last day for filing arguments and examiner's report, April 5; day-of-hearing, April 10.

EXTENSIONS GRANTED.

18,882.—SNOW-PLOW.—Newcomb Demary, Jun. Dec. 15, 1857.

18,959.—SEEDING-MACHINE.—William Coggeshall and Bennet B. Warner. Dec. 29, 1857.

19,872.—Reissue, No. 3,133.—BORING-MACHINE.—Lafayette Stevens. December 15, 1857; reissued Sept. 22, 1868.

18,945.—MODE OF LIGHTING GAS BY ELECTRICITY.—Samuel Gardiner, Jun. Dec. 22, 1857.

19,912.—GOVERNING THE CUT OF CIRCULAR-SAWING MACHINERY.—A. C. Martin and William H. S. Ewell, administrator of M. M. Wombaugh, deceased. Dec. 22, 1857.

18,945.—Reissue, No. 3,460.—MOWING MACHINE.—Silas C. Jackson and Morgan P. Jackson. Dec. 29, 1857; reissued May 25, 1869.

18,906.—Reissue, No. 4,171.—MACHINE FOR ROLLING CORNICES.—Asa Johnson. Dec. 22, 1857; reissued Nov. 1, 1870.

NOVEL AID TO LONGEVITY.—People who are willing to sleep shut up like a jack-knife will be delighted to know of a new process of insuring longevity. A California scientist, whose head like his back must be a trifle weak, declares that he has prolonged his life by sleeping with his finger-tips touching his toes, and has invented a machine to hold the body in that graceful and pleasant position. He contends that the "vital electric currents"—on the principle, we suppose, of the smoke-consuming stove—"are thus kept in even circumflow, instead of being thrown off at the extremities and wasted." There is no patent upon the great discovery, and any one with a sufficiently supple back is of course free to try the experiment.—*Tribune.*

MR. HENRY COXWELL, the aeronaut, replying to the hypothesis "that one-half of the number of professional aeronauts had been killed in the exercise of their vocation," says that, of the 3,500 ascents executed in Europe and America, fifteen deaths only have been recorded.

A CONTEMPORARY relates that "thirty-seven enthusiastic members of the 'Massachusetts Society for the Prevention of Cruelty to Animals,' made one horse draw them last week to a concert in aid of the Society at Salem."

A PLEASANT mill privilege—kissing a factory girl.

Letter Box

D. M., JUN., OF N. Y.—1. Coiled springs capable of a tension equal to thirty-three thousand pounds are not manufactured as an article of common sale. To obtain such a spring you would doubtless have to make special arrangements with some establishment working steel or hard-rolled brass. 2. You will find in another column the latest available news item concerning steam on canals.

A. J. J., OF MASS.—The temperature in the bottom of a vacuum pan, heated from below adjacent to the heating surface, is of course greater than at the top of the liquid or evaporating surface; but such excess of temperature as is due to the greater pressure consequent upon the weight of the liquid above is quite inconsiderable. The main source of such excess of heat is that the liquid at the bottom is so placed as to receive more heat. Were it otherwise, the rising of the heated particles and consequent communication of heat by convection would not take place. Probably a better evaporation could be obtained from the use of steam than by direct furnace heat.

C. R., OF VT.—Wire may be annealed by placing it in a kind of reverberatory furnace surrounded by the flame on suitably arranged iron bars. In a French process steel wire in coils was placed in an annular chamber from which air was excluded, and which was heated by a furnace surrounding it. In some works the coils of wire are plunged into a clay bath and dried previous to annealing. The clay covering, by excluding air from the metal when hot, prevents oxydation, which interferes with any subsequent reduction of size by drawing.

G. L., OF IND.—That the "principle" of the invention was tried years ago and found wanting does not militate against the utility of your plan if your improvements have merit. There is scarcely a successful invention in the world that was not in part anticipated by some previous mechanical failure. You have better tools, better materials, and bet er scientific data to guide you than your predecessors, and we think your devices possessed of decided merit. Go ahead.

F. L. W., OF OHIO.—Your potato-digger, that digs a trench and lifts the dirt into a rotary screen to shake out the dirt through its openings and empty the potatoes into a bag at the side, certainly appears to be novel, and, if it does not cost too much to make and operate, may prove a good thing. There is certainly room for the profitable introduction of a good potato-digger.

T. T. L., OF N. Y.—Fesquet gives the following as the composition of so-called yellow pewter, which may possibly serve your purpose:—From 55 to 60 parts of copper, 30 to 40 of tin, and 10 to 15 of zinc.

D. V., OF N. J.—To preserve the ornaments on your woodwork while repainting adjacent surfaces, coat them with two successive coats of glue and whiting. When the job is ready for the varnish, wash off the glue and whiting and varnish over, the same as the repainted surface.

E. H., OF N. J.—To make tincture of musk, triturate together in a marble mortar one drachm each of musk and white sugar candy; add during the operation five ounces of rectified spirits of wine. Put the whole in a flask, and subject to a gentle heat for three days. Pour off the clear tincture from the sediment, and keep it in a tightly corked bottle.

B. H., OF PA.—The greater the speed of trains, the smaller must be the curves of the railway; usually on English roads a radius of one mile where practicable is recommended. In this country curves having a radius of only four hundred feet are not unknown, and one curve, on the Baltimore and Ohio Railway, has a radius of but three hundred and eighteen.

L. L., OF MO.—Your use of a slotted vibrating india-rubber band strained in the bottom of a seeding-machine hopper to agitate the seed adjacent to the dropping orifices is new to us, and, we think, patentable. We would advise you, however, to try it in comparison with some of the more approved stirring devices in common use, to test its utility before applying for a patent.

E. J., OF CONN.—That tobacco, when pressed in hogsheads, has to stand under pressure at intervals in order to "set" will prove, we are afraid, a practical objection to your alleged rapid method of performing the operation. For other purposes your press seems to us an excellent apparatus.

THIN iron sheets are smooth and easy to write on. The mill manager of the Upper Forest Tinworks, near Swansea, has succeeded in making a sheet ten by five and a half inches, or fifty-five inches in surface, and weighing about twenty grains, and of these sheets at least 4,100 are required to make one inch in thickness.

NEW PUBLICATIONS.

HEARTH AND HOME.—This periodical, among the very first in the country for the literary ability displayed in its columns and for the high moral tone of its contents, enters the new year with increased attractions. It is so much the fashion nowadays, say the publishers, to convey information, and moral truths and sentiments, in the form of stories, that even some popular lecturers have adopted this style of address. The mass of people, especially the young, demand stories to such a degree, that papers filled with sensational novels and exciting, trashy stuff have a wide circulation. To forestall this taste, and supply something better to the masses, the publishers of *Hearth and Home*, in addition to the usual variety of that paper, have engaged a corps of first-class writers, among whom are Jean Ingelow, Edward Eggleston, and many others, who furnish to this journal the best original stories, of the purest character and highest grade—thus conveying much instruction in a pleasing form. Besides these, the weekly *Hearth and Home* contains a large amount of first-class reading, editorials, literature, art, science, amusement; instruction for the housekeeper, the gardener, the farmer; a capital department for children and youth; the news of the day; financial and market reports, etc. Its engravings, costing over $25,000 a year, are of a high order of merit. It is supplied at the low rate of $3 a year; four copies for $11; and ten or more copies for $2 50 each. Orange Judd & Co., Publishers, 245 Broadway, New York City.

THE HOOSIER SCHOOLMASTER, first published (and just completed) in *Hearth and Home*, is published by Orange Judd & Co. Price $1 25.

It is a tale of life purely American in its phases, the scene being laid in Hoop-pole County, Ind. The characters are sharply drawn, and the story increases in interest to the very close. It is full of a quaint humor, a tender pathos, and vivid descriptions. The book is bound in fine cloth, printed on heavy paper, and contains 226 pages, with twelve full-page illustrations on tinted paper, and many other cuts, designed by Frank Beard.

SEED-PRESSING DEVICE.—In a late invention the molds in which the seed-bags are inclosed in the extraction of oil from flax, cotton, and other seeds are of ox-horn, in transverse strips fastened by longitudinal screwed iron rods, and strips of calico or other fabric are inserted between the strips of horn. The united strips of horn form two slabs connected together by a leathern hinge, which are grooved transversely as usual, and have twisted horse-hair fastened at their outer edges for the expressed oil to pass through.

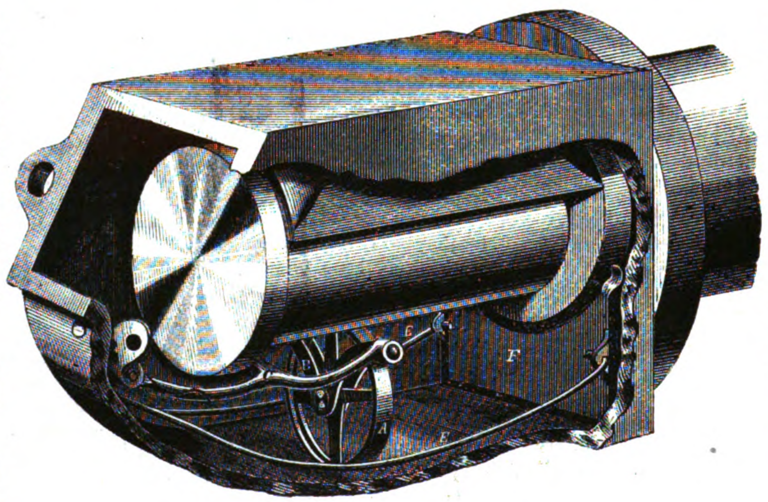
SNOW IN COTTONWOOD CANYON.—Advices dated Dec. 22 state that there is ten feet of snow on the level in Little Cottonwood Mining District in Utah, and it is still snowing. The freighting of ore from the mines is wholly suspended. The sun has not been seen for a week.

MICE AND MATCHES.—On the morning of Dec. 23, some mice got at friction-matches in the building, 173 Hester Street, New York City. In consequence, the structure was fired with a loss of twenty-five thousand dollars.

Sanson's Patent Lubricator.

THE lubricating device illustrated in the accompanying engraving is intended more particularly for railway axles, and is designed not only to insure a perfectly uniform and continuous supply of the lubricant to the journal when in motion, but to provide against waste of the material by leakage or oozing between the inner end of the journal and the adjacent and surrounding surface of the box. It was patented in the United States through the "American Artisan Patent Agency," Jan. 2, 1872, by John L. Sanson, and measures have been taken to secure a patent for it in England. Its construction and operation will be understood from the appended descriptive sketch.

The journal, journal-box, upper brass, etc., are of any ordinary or suitable construction. Under the journal, and with its lower portion arranged to dip into the supply of lubricant placed in the reservoir formed by the lower part of the box, is a wheel, A. The bearings of this wheel are in the forked free extremity of an arm, C, which has pivotal connection with the inner end of the box.



SANSON'S PATENT LUBRICATOR.

This is provided for by a metallic clip at *b*, which also carries a spring so applied to the arm as to constantly press the same upward to maintain the wheel, A, in contact with the journal. From this it follows that the oil or lubricant taken up by the wheel will be transferred uniformly to the surface of the journal with which it moves in contact, the regular and efficient lubrication of the journal being thus insured; whereas, were not the contact under all conditions of the wheel with the journal provided for as explained, the device would soon become practically inoperative.

A second feature of the invention is constituted by the parts E and F. The former is a wire-spring arranged in the lower part of the axle-box in such manner as to press upward the pad-block, E, against the adjacent surface of the annular flanch on the axle. This pad-block is semicircularly recessed in its upper side to fit the periphery of the flanch just mentioned, and has its circumference covered with a layer of felt. Thus constructed and applied, it constitutes a wiper, which, by wiping the surplus lubricant away as fast as it reaches the circumference of the flanch, prevents the passage of the lubricant out through the end of the axle-box and the waste that would result therefrom.

Address Charles Mettam, 395 Canal Street, New York City, to whom an interest in the invention has been assigned.

Pacific Coast Whaling.

EVERYTHING is in readiness for the commencement of an active season of whaling, which, we are inclined to believe, will prove prosperous from the fact that an unusual number of whales have been seen already this year. Usually the gray whale does not commence his migration southward until about the 12th of the present month, and but few are seen even at this date in the vicinity of San Diego Harbor. Mr. Matthias has four large whale-boats, each of which will be manned by six men. The whales are taken in the same manner as is adopted by the whaling-ships, with the exception that the whale, when captured, instead of being hauled to the ship, is towed to Ballast Point, where the facilities for trying the blubber are much greater than on shipboard. In the capture of the whale by these men they use, in addition to the ordinary harpoon, the bomb lance. With this latter weapon the whale is usually killed at once, the force with which it is driven causing a fatal wound almost invariably. When killed in this manner, the whale remains on the surface of the water, and is easily towed into the harbor. If the harpooning process is resorted to, the whale, on being wounded, generally dives to the bottom and remains there to die. When the water is very deep, it is impossible to raise the carcass to the surface without the aid of such machinery as is usually used aboard of a whaling-ship for the purpose of hoisting. It would, therefore, be necessary for our whalers to abandon a great many if killed in this manner. Hence the bomb is more frequently used than the harpoon. Mr. M. Bruschi is also fitting up the schooner *Lark* for the purpose of engaging in the whaling business.—*San Diego Union.*

Life Preservers.

THE United States Government has decided to hereafter allow the use by steam-vessels of all cork life preservers adjustable to the body of a person, by whomsoever manufactured, when such preservers are so constructed as to meet the requirements of Rules 51 and 94, adopted by the Board of Supervising Inspectors, viz.: "When made of good, sound cork blocks, containing at least six pounds of cork, having a buoyancy of four pounds to a pound of cork, with bolts and shoulder straps attached in such a manner as to preclude the possibility of their being accidentally detached from the body, and so constructed as to place the cork underneath the shoulders and around the bodies of the persons wearing them." In passing preservers, inspectors will therefore pay no attention to the list of manufacturers appointed in the Department circular of November 6, 1871. Each local inspector will be furnished with a copy of the above.

A PROPOSITION to light the streets of Mount Vernon, Indiana, was opposed in the City Council of that burgh on the ground that, if the streets were lighted, thieves would be enabled to see when they were watched, and consequently it would be impossible to catch them.

A MECHANICAL turnspit, which keeps a wooden pig constantly rotating in a tin reflector, is one of the culinary contrivances now displayed in furnishing-stores in New York City.

BROWN, COOMBS & CO., Publishers.
ISSUED WEEKLY AT
No 189 Broadway, New York.
E. T. BROWN. J. W. COOMBS.

AGENTS.
American News Company....New York City.
New York News Company.... do
New England News Company....Boston.
A. Winch & Co....Philadelphia.
H. Taylor & Co....Baltimore.

WEDNESDAY, JANUARY 10, 1872.

THE PAVEMENT QUESTION.

A RECENT article in the *Journal of the London Society of Arts* states that in New York "the Val de Travers pavement is now being actively taken up." It may be that in some by-street of New York a small area may have been paved with the Val de Travers asphalt, and so affords an opportunity for its "active taking up," but we are not cognizant of such being the case, and are strongly disposed to believe that abroad, as to a very great extent at home, the genuine asphalt has been made to bear the blame due to a factitious and worthless compound. To import the product which has given such satisfaction on the Paris streets would cost more than the jobbers who have so long controlled our public works would find it profitable to pay. Neither could any efficient substitute be made, for the expense of the transport of California bitumen shuts it off from Eastern markets, while, as we understand, the tariff on the product of the Pitch Lake of Trinidad works its virtual exclusion. Coal-tar, therefore, the nuisance of carelessly made "plastic roofs" and the triple nuisance of our so-called asphalt pavements, has been the only material that from its small cost could offer the possibility of a sufficiently cheap substance for the purpose under consideration. The pavement put down and then taken up from the Belgian surface of Fifth Avenue was a fair sample of the products thus brought into existence.

The comparative noiselessness of an asphalt pavement and its impermeability to noxious vapors rising from the sodden ground below are advantages that more than counterbalance any probable excess of cost, and, with a material that would not yield its dust, as did the tar and gravel on the street just noted, in suffocating volumes, would undoubtedly meet the unsatisfied demand of the times for a better pavement than we now have. But for the reasons just hinted at, an asphalt pavement of this kind is not likely soon to be within reach of the American public. Stone and macadam have their drawbacks too obvious to need mention, while wood as laid down in New York, and, for all we know to the contrary, everywhere else, becomes saturated with vile liquids that steam and reek under the warmth of the summer sun ; more than this, wood with us sinks into hollows, wears off too rapidly under abrading wheels, and rots much sooner than good timber does under almost any other conditions. There is evidently beginning a reaction against wood pavements which will prove a material obstacle to their much more extended adoption, and which may aid somewhat the introduction of new, and it may be equally imperfect, plans. But a close study of the subject will show that wood, after all, possesses merits which no other material has, and which have not been and could not be scientifically demonstrated in the money-getting haste with which the wood-pavement schemes of this and other cities have been urged.

A pavement formed of waterproofed blocks, and fireproofed as well, of first quality timber, and laid upon a bed of impervious concrete, has not, to our knowledge, yet been laid. When it is, and is properly tested, many of the objections urged against wood pavements as a class will disappear. But the question of their adoption will then assume a new phase. Constructed with the degree of excellence just specified, their cost will be excessive. This will undoubtedly be more than counterbalanced to the public in saving in wear and tear of vehicles and draught animals, and in the avoidance of annoyance from the now common uproar of the street. But it will be hard to make the public, or at least the tax-paying part of it, understand or admit this, and when a truly efficient wood surface for our streets is devised the battles of wood pavements will doubtless have to be all fought over again.

CONCERNING CANDLES.

IN these days of kerosene, the importance of candles is somewhat dwarfed, although paraffine and other materials of comparatively recent adoption furnish light far better than the old-time tallow, and equal at least to the costlier sperm. Candles are far, however, from going out of use, and especially in the working of mines they are used for illumination in preference to the most improved lamps that mechanicians have been able to devise. At the Comstock lode more candles are burned below ground in the drifts than would be needed to give light in all the dwellings of Virginia City and Gold Hill above. For such use in industries, even more than for household purposes, it is desirable that the flame should be as uniform as possible. But the approach to perfection in this respect is very slight.

In the days of our great-grandfathers, Count Rumford made some experiments to determine the variation of the light emitted by a candle from the time of one "snuffing" until a repetition of the same was required. He found that, assuming the light of the newly snuffed candle to be one hundred, after burning for eleven minutes it was reduced to thirty-nine, and in half an hour to eleven. It is this gradual diminution of the light and its sudden increase when the wick is snuffed that render candle-light so injurious to the eyesight. Although better material is now used for the body of the candle than when this trial was made, no improvement designed to do away with the need of snuffing the wick has been found feasible. If such was once devised, the originator would deserve no small share in the gratitude of mankind to its benefactors.

One objection made to candles of tallow is that they gather and drip, and this also prevents the use, for cheap candles, of soft grease, that costs less per pound even than tallow. It was at one time practiced as a sharp dodge to coat a soft candle with a thin covering of harder material, in order to pass it off for one wholly of the latter. It was soon found, however, that this made an excellent candle in proportion to the cost, as the less readily melted coating confined the melted grease in a cup around the wick, and thus prevented the dripping, etc. Numerous devices to manufacture candles on this plan have been projected. One of the latest of these was an English invention, and comprised molding the soft inner core separately, but with projections at the end, so that when placed in a larger mold, the projections would hold it in the center. Thus placed, the core had poured around it the melted paraffine or other material for the hard outer coating. Neither have efforts been wanting to insure a more perfect combustion of the melted material as it rises in the wick by air-passages formed in the candle, so as to conduct air very close to the flame. Some months since, an American patent was granted on quite a different device—a tubular candle, with a bore of flattened or oblong cross-section, to receive a detachable wick, or, if desired, a wick-tube.

We close the present brief candle-sketch by reference to an asserted *desideratum*—a candle having a colored flame suitable for *fêtes* and illuminations commemorative of great events. But this has long baffled inventors, and will undoubtedly long continue to do so.

TRANSMISSION BY PNEUMATIC TUBES.

THE propulsion of bodies by pneumatic pressure had, perhaps, its first example in those feathered darts which certain savage tribes project at their enemies by blowing them through hollow reeds. The principle of this is the same as that of the atmospheric railway so-called which, in various forms, has, in this country and in England, been the subject of between fifty and one hundred different patents. The system—apart from the partially developed scheme of the pneumatic tunnel under Broadway in New York City—has been advantageously carried into effect mainly in the transmission of packages, for which it is apparently capable of almost indefinite extension. In London, Paris, and Berlin, it has been used with the most decided success for the transmission of messages between telegraph offices, and it is now proposed in the first-named city to adopt the plan for the city letter post service—a purpose for which it has also been advocated by parties in New York, who, as we understand, have been carrying on experiments to test the feasibility of connecting it with the lamp-post letter-box system. The prospectively increased utility of this mode of transporting postal matter of all kinds gives importance to recent improvements or modifications in it ; and some interest, at least, to the form in which, many years ago, it first made its appearance.

The most recent experience with the pneumatic tubes in London has given an average speed to the carrier of about nine feet per second, the velocity being least at the point farthest from the appliances by which the vacuum is produced, and gradually increasing as the carrier nears the latter. The necessity of a steam-engine complete, with air-pumping machinery, etc., was found to be an objection of no little weight to the introduction of the pneumatic tubes ; but this has of late been been remedied by a device at once simple and, it is claimed, effective, and of which the cost is but one-twentieth of that of the motor and the mechanism at first employed. An annular steam jet from a suitable generator is caused to issue away from, but concentric with, the vacuum end of the tube, and by its inductive action draws the air in a continuous current from the interior of the tube. By this means, at a cost of working less than that of a steam-engine of the power needed to produce the same result, a vacuum equal to a column of twenty-three inches of mercury was readily obtained.

We have briefly referred to the form in which the pneumatic tube was first projected for a purpose closely analogous to its present one. It was on February 9, 1824, forty-eight years ago, that John Vallance received an English patent on "a method of communication or means of intercourse, by which persons may be conveyed, goods transported, or intelligence communicated from one place to another with greater expedition than by means of steam-carriages, steam or other vessels, or carriages drawn by animals." The means of carrying out his invention, which includes the more essential features of all that in this line has been projected since, he described as follows:—"A hollow tube or cylinder reaches from one to the other of the places between which communication or intercourse is to be made. The tube is composed of cylindrical pieces, about twelve feet long, six feet in diameter, and one inch and a quarter in thickness, and bored out truly cylindrical. They are laid and embedded in masonry, and carried over rivers on bridges; at the joints, to make them tight, they are hooped round, a quarter of an inch being left for expansion. A piece of cast-iron is fixed along the bottom of the cylinder, to form a groove, channel, or track for a wheel to run on, similar to a railway. A hollow cylinder, or piston made of framework, about twelve feet long, is placed inside the tube, with a wheel in the center intended to run in the groove or channel inside the tube. This combination of apparatus, by which persons may be conveyed or goods transported from one place to another by being placed inside the piston or traveling vehicle, is moved by forcing air in behind it or exhausting it from before it by an arrangement of valves and air-pumps."

The only material defect apparent in the plan as thus described seems to be that the tubes were to be cast in sections of great size, and the production of which was especially difficult half a century since. Had the inventor devised a cheaper tube, he would have nearly perfected at the outset the theory of a pneumatic passenger railway, and, had he confined his ambition to the transmission of light parcels, he might, in those days before the electric telegraph, have anticipated by many years the now prospective success of the atmospheric postal system.

NOTES FROM OUR FRENCH EXCHANGES.

Action of Light on Cane-sugar Solutions.—It is commonly admitted at the present time that at ordinary temperatures a solution of cane-sugar will retain indefinitely its taste and chemical properties. This is an error. I have observed on several occasions that a solution of cane-sugar, without being subjected to the slightest fermentation, may at length become changed and transformed into glucose. In the course of a year I have made experiments proving that this results from the action of light. The experiment was as follows:—

On the 12th of last May, 10 grammes of white sugar were dissolved in 50 grammes of pure water; equal volumes of the solution were placed in tubes of white glass, and subjected to ebullition during several minutes, after which and before the re-entrance of air the tubes were hermetically closed. The tubes thus prepared were placed, one in a situation completely dark, the other in a place well lighted, the two being meanwhile so arranged as to be subjected to the same variations of temperature. Five months after, Oct. 20, I opened the tubes. The solutions were perfectly transparent, and contained no microscopic vegetation whatever. That which had been kept in the dark showed no reaction with cuprate of potassa; it contained, therefore, no glucose. On the contrary, the sugar solution which had been exposed to the light gave, with the same reagent, an abundant red precipitate. One-half of the sugar in this part of the solution was found to be converted. Thus, under the influence of light, cane-sugar dissolved in water may be slowly changed to glucose or grape-sugar. It may result from this that a saccharine sirup may contain much glucose when the manufacturer has provided in it only cane-sugar, and the presence of glucose does not necessarily imply wilful adulteration.—*E. M. Raoult en Les Mondes.*

Alarm Signals for Railway Vehicles.—M. F. Herremans, engineer, proposes to introduce in railway vehicles an alarm signal which can be heard at a great distance, and which in the night is readily made visible to the conductor of the train to warn him of danger ahead. Buttons (movable and suitably connected with the working parts) are placed in the interior of the vehicle, and put in play, when pressed, a mechanism which at each impulsion makes a bell resound, this bell being situate at or over the top of the car or vehicle. Simultaneously with this, the mechanism causes to be lifted the lantern by which one of the compartments of the vehicle is lighted. Thus elevated, the lantern uncovers an aperture, by which the light, aided by a reflector, is projected into the room or place occupied by the conductor, and warns him of the danger. The signal is therefore twofold, and addresses itself both to the eye and to the ear.—*Le Génie Industriel.*

Preservation of Meat.—M. Tellier has exhibited, as examples of the success of the process, specimens of meat preserved for a period of fifteen months by means of desiccation. This meat is desiccated in a vacuum by the action of absorbents of moisture. Under these conditions it loses from twenty to twenty-five per cent. of its weight. This insures, to a very great extent, its preservation.

The product differs notably from the meat desiccated in America in this, that it is prepared in the cold and away from the action of air; this being made essential in order that the meat shall not contract any peculiar taste. It follows that the method, by retaining to the meat its own peculiar flavor, insures its fitness to make good *bouillon.* It is not proposed to limit the process to the preparation of strips of dried flesh or merely to the muscular portions of animals, but also to pieces on the bone, to the fats, and those portions mingled with adipose tissue; in a word, all that constitutes the *pot-au-feu.* M. Tellier insists on this part of the question, because, in his eyes, the *pot-au-feu* is "l'element par excellence" suitable to all classes, to all ages, and consequently to all who have to study economy.—*Bulletin de Musée de l'Industrie.*

Lubrication of Steam-engine Stuffing-boxes.—It has long been known that graphite reduced to a fine powder is employed in lubricating clockwork, even the most delicate, as in chronometers. We know also that in the cylinders of blowing apparatus in which the packing is of leather, graphite is the only means of lubrication employed, introduced through the inlet-valve. These facts induced M. Memmiger to fill the stuffing-boxes of pumps with a mixture of graphite prepared by decantation, and laid in such a way that it would be constantly compressed against the piston-rod, and thereby continually lubricate the same.

Now, if we fill the stuffing-box of a steam-engine with this mixture, or, what amounts to the same thing, in order to give consistence to the graphite, we replace the grease with water, we obtain the same effect, because the graphite in contact with the piston while lubricating the same is itself kept comparatively cold by the vapor and water of condensation which are introduced in small quantities between the piston and the packing. This mode of lubrication may also, of course, be made to substitute the use of ordinary grease. The only precaution necessary is to open the stuffing-box from time to time to prevent the graphite from becoming too fluid in its condition.—*Bulletin de la Société d'Encouragement.*

The New Steamboat Act.

A writer in the Pittsburg *Commercial*, over the initials T. W. B., speaks as follows concerning recent steamboat legislation:—

"The proposed new steamboat law is not exempt from error or inconsistency. In Section 39, boilers may be tested by hydrostatic pressure to any degree at the option of the owner, and be allowed to carry steam to three-fourths of the test. But 'in no case, however, shall the working pressure allowed produce a tensile strain per sectional square inch exceeding 10,500 pounds.'

"From the context, we suppose this limit of 10,500 pounds is intended to apply to a boiler of ¼-inch iron; then, one-fourth of the above 'sectional square inch,' or 2,625 pounds, and if of 40-inch diameter, would be met with 62½ pounds of steam, according to the prevalent erroneous estimate of pressure as the diameter, and by the correct estimate as the semi-circumference, only 41⅔ pounds of steam would be required to give the strain. Either the 'sectional square inch' should be erased, or four times the limit of 10,500 pounds, equal to 42,000 pounds, take its place.

"If the restrictions of Section 39 be predicated on the diameter error, the said limit of 10,500 pounds must be reduced to 6,666 pounds to insure proportional surplus strength of the boiler."

New Phosphatic Fertilizer.—It has been discovered, says a foreign exchange, that, by water-grinding and levigating a phosphate very finely, it may be applied as a manure without making it into superphosphate, or for making superphosphate. The material is placed in a hollow rotating cylinder, mounted on its bearings in the line of axis, and only partially filled; water is introduced, the cylinder revolved, and the material ground by the attrition of its particles upon each other.

Gas-jets for Beacon-lights.—An inventor in Dublin, Ireland, has devised a new mode of applying the flame of gas in light-houses. The supply of gas to the burners, when not required to show light, is reduced by a cock or valve, actuated by clockwork or other mechanism, and again turned on full when required, and is thus made intermittent.

The two-hundredth anniversary of the birth of Peter the Great is to be celebrated in Moscow by a polytechnic and international exhibition, to be opened in June, 1872, and to close with the last day of September.

Baking-soda is defined down South as "that 'ere stuff what you puts in biskits that makes 'em git up and hump themselves."

English farmers consider cotton-seed meal one-third more valuable for feed to stock than the best corn meal.

Exhibition of the National Inventors' Association.

THE second exhibition of the National Inventors' Association will be held in the Central Rink, Cleveland, Ohio, on the 21st inst., and for the five successive weeks. The association was organized two years ago, and held a very successful fair in the city of Hartford. Upwards of 1,500 entries were represented at this exhibition. The fair continued for five weeks, and proved such a success that the association organized on a permanent basis, and made arrangements for holding their next exhibition in Chicago, but the great fire prevented, and Cleveland being the next choice of location they made arrangements accordingly, and have already assurances that this one will be the largest and most attractive exhibition ever held in the West. Inventors from all parts of the Union will be represented, by wonderful models, beautiful machinery, startling novelties, works of art and handicraft, forming the greatest variety of attractions ever combined in one exhibition, and it is hoped this city will be the permanent place of their future exhibitions.—*Cleveland Plaindealer.*

TRAP-GUNS.—It appears to be a common practice for owners to guard their establishment from burglars by the deadly aid of spring guns. Some months ago, a burglar was killed by one of these divices while attempting to enter a jewelry store in New York City, and not a week since another of his class was shot in like manner in a factory in Newark, N. J. In this case the evidence given to the coroner's jury showed that the gun was of the "blunderbuss" pattern—an old musket cut off near the barrel. This weapon was placed at the end of a long table, upon which the manufactured stock of the foundry was stored, its muzzle pointing along the side of the table. A string was attached to the trigger, and, running over a pulley, extended along the edge of the table. The burglar, by standing at the table, disturbed the string and discharged the load into his body. The jury, after hearing all the evidence, exonerated the owners from all blame.

A CAT AND A MOUSE STORY.—The *Evening Mail* is responsible for the following cat's tale:—

A cat, in Fitchburg, Mass., lay down in a fly-wheel, early one morning, and was not discovered till the engine had been running three hours; a dog then detected her and gave the alarm. When the engine was stopped, the cat was rescued uninjured, after making sixty revolutions a minute for three hours.

The same paper also narrates that a mouse in Belfast, Me., was found, the other day, frozen stiff upon a hammer. Investigation showed, that in picking up something that lay on the iron head of the hammer, the tongue of the mouse had frozen to it, and, being unable to get away, it died.

CAPT. R. A. FITZHUGH, a railway engineer, is maturing a plan for the building of a freight railway through the streets of Richmond, Va. He proposes to supersede to a great extent the hauling of merchandise and raw material from the dock to the mills, stores, or foundries by drays and wagons, and to substitute therefor hauling by railway cars at a very low tariff of rates.

THE number of marine disasters on the Lakes during the present season, as reported by Captain Hall, marine reporter for Detroit, is 1,167, of which 225 were collision, 280 went ashore, 31 burned, 26 capsized, 19 foundered, 132 sprung a leak, 65 were water-logged, 60 were dismasted, 110 lost deck-loads, 10 were explosions. The remainder were of minor importance.

A Dangerous Ferry-boat.

OF all things in the way of ferry-boats that ever were seen are the craft that ply from the foot of East Ninety-second Street to Astoria. One is called the *Sunswick*, and is the most wretched-looking vessel imaginable. A little shanty, smeared over with paint, perched upon a great wash-tub is the nearest likeness that can be used in print. A wheezing old engine is located in its centre, and moves the incongruous mass with uncertain speed. The *Times* reporter endeavored to ascertain its age and condition. None on board could tell the former, but claimed it was a "first-class steamer," which provoked a guffaw of laughter from a group of colored bystanders. A passenger, however, said: "It has come down to us from a former generation; it is 'threescore and ten,' and a little punch from some vessel, an ice-cake, or if the engine fails and the 'Hell-gate' tide sweeps it down against the rocks some time, you will see what its condition is. It isn't fit to carry a cat across." The whole aspect of the craft is wretched in the extreme.—*New York Times.*

Another Boston Jubilee.

BOSTON is preparing for its second festival of noise. The huge building to be erected for the next great "jubilee" will be 822 feet long by 422 feet wide. The "Coliseum" of 1869 was only 500 feet in length by 300 in breadth. The height of the new building is to be 172 feet, the roof supported by arches which will spring from the ground on each side and end. There will be no pillars or other obstructions in the immense auditorium. The amount of sound which delighted Boston can get into a barn of these dimensions can hardly be computed. A dozen twenty-inch Columbiads will seem like a battery of toy pop-guns, and an earthquake would pass for a solo on the kettle-drum.

SUGAR FROM MOLASSES.—To obtain crystallizable sugar from molasses or low-class sugars, they are mixed, according to the process of a London, England, manufacturer, with a milk or paste of lime to form a saccharate of lime, which on crystallizing or solidifying is cut up or reduced to expose it to the action of water, by which the soluble salts and organic matters are dissolved out. A pure saccharate of lime is thus obtained, which by carbonization yields a pure sugar readily crystallizable.

THE Southeastern Railway of England has asked Parliament for the right to combine with the Northern Railway of France, with assistance from the governments of France and England, to "improve the communication between England and the Continent." The proposed improvement will involve an under-water passage across the Channel, which it is proposed to line with concrete through the chalk.

A JEWELRY dealer in New York has on exhibition and sale a bouquet of artificial flowers, amid which sits a bird of brilliant plumage. Suddenly, the bird springs to life, and carols forth as sweetly as if among his native woods and beneath his own tropic skies. The price of this pretty bouquet and singing-bird is, we are informed, $175.

A BELLIGERENT APPLE.—In a California theatre, a few nights since, a large, red apple fell from the gallery, and struck squarely upon the bald and shining pate of a gentleman in the dress circle, then bounded into the orchestra and broke a fiddle.

IT would cost more now to build the great wall of China, through its extent of one thousand miles, than it has cost to build the fifty-five thousand miles of railroad in the United States.

Vienna Yeast.

VIENNA yeast is prepared in the following manner:—Previously malted barley, maïs, and rye are ground up and mixed, next put into water at a temperature of from 65° to 75°; after a few hours, the saccharine liquid is decanted from the dregs, and the clear liquid brought into a state of fermentation by the aid of some yeast. The fermentation becomes very strong, and, by the force of the carbonic acid which is evolved, the yeast globules (the size of which averages from 10 to 12 millimetres) are carried to the surface of the liquid, and, forming a thick scum, that substance is removed by a skimmer, placed on cloth filters, drained, washed with a little distilled water, and next pressed into any desired shape by means of hydraulic pressure, and covered with a strong and stout tightly-woven canvas. This kind of yeast keeps for from eight to fourteen days, according to the season, and is, both for bakers and brewers, very superior to that ordinarily used; the extra good qualities of Vienna beer and bread are partly due to the use made of this yeast in preparing these articles.—*Chemical News.*

Steam on New York State Canals.

WE quote from the just rendered Report of the Auditor of the New York Canal Department the following as the latest item concerning the proposed prize for successful steam propulsion on canals:—

"The Legislature of 1871 passed an act entitled 'An act to foster and develop the internal commerce of the State, by inviting and rewarding the practical and profitable introduction upon the canals of steam, caloric, electricity, or any motor other than animal power, for the propulsion of boats;' and appropriated for that object the sum of $100,000, to be paid to the owners of the successful plans, not exceeding three in number, which might be submitted for trial, and tested and approved by the commissioners appointed under the act.

"As yet, the reward has not yet secured that object. It is believed, however, that it has caused an agitation upon the subject, which will, sooner or later, result in success.

"While it would be very desirable to apply steam as a motor to the form of boats now in use, it is deemed by many to be impracticable with the canals at their present dimensions.

"The Belgian system was exhibited on the Erie Canal, between Albany and West Troy, previous to the close of the navigable season of 1871. Its operation was witnessed by the State officers and distinguished citizens from different parts of the State.

"It is claimed by the advocates of the system that its general introduction would be attended with complete success in diminishing the time of trips, the cost of transportation, and increasing the capacity of the canals. This plan of towage appears to have been excluded from competing for the reward offered by the State. No good reason is seen for the exclusion of this or any other apparently practicable system from the benefits of the act."

THE number of tin cans used in Baltimore is estimated at twenty millions per annum. Tin cans are made at shops where nothing else is done. Some packers (and nearly all the large ones) employ can-makers for the accommodation of their own business. Can-making has assumed the importance of a regular trade there, and the operators are now conducting an organized strike for higher wages.

COMMUNICATIONS

TO CORRESPONDENTS.

We wish our readers to understand that, in freely publishing communications, we do not hold ourselves responsible for the opinions of our correspondents, inasmuch as we may occasionally publish views opposed to our own.

Leaky Roofs, Icicles, Etc.

MESSRS. EDITORS:—I know that Mr. Campbell, of Yorkville, says that, to prevent his roof from leaking in winter, he has now on his rafters four coverings, viz., shingles, felt, tin, and corrugated iron.

I know that the agent of the company, who put on the iron covering, told me that it was not impervious to the backwater resulting from ice on the eaves.

I know that this accumulation of ice on the eaves is the inevitable consequent of the fact that the roof is several degrees warmer at the apex than at the eaves. The internal heat of the building naturally produces this result, causing the snow to melt on the upper part of the roof before it melts at the eaves. This snow-water congeals as it descends upon the roof, and forms an ice dam upon the eaves, which is the coldest point. Hence backwater and leakage, not only through shingles, or slate, or tile, but through metallic coverings, which are contracted by the ice and frost, and thus open a passage for the backwater.

The agent examined and approved of the following plan to prevent the accumulation upon the eaves, based upon the principle of equalizing the temperature of the roof, by means of heated air or steam tubes, warmed by internal heat, derived from gas-burners, etc. Hence the water from the apex flows into the eave-trough instead of piling upon the eave, and no leakage ensues.

But just here we meet with the icicle nuisance, which, I know, may be abated upon the same principle adopted to prevent leakage.

The primary cause of icicles is the stoppage of the mouth of the conductor by ice, which gradually forms from the drip of the warm roof, congealing at the coldest point first, viz., the mouth. The water then rises in the conductor, flows back into the eave-trough, and, being stagnant, soon fills both conductor and trough with a solid body of ice. Meantime the water from the warm roof continues to run and overflow the eave-trough, forming icicles, etc.

Hence, apply heated air or steam to the mouth of the conductor, and the mouth will not close; and the air or steam will rise up to and under the bottom of the eave-trough, if you double both conductor and eave-trough, leaving a flue-space of about an inch as an air-passage.

By this simple and economical arrangement, within the reach of all, from the prince to the peasant, we may save money and increase comfort. If you have no fire in your basement, a gas-burner or common lantern will be sufficient to clear the mouth of the conductor, the heat being passed through the window or other aperture by means of a tin conductor. Heat may be applied from each story of the building if it is very high, and so the roof, if very large, as in the case of the railway depots, may be warmed by a coil of steam-pipe running in contact with the roof-boards, and thus prevent heavy iron roofs from caving in from the weight of snow, as recently has been the case at Saratoga. I know that, at the suggestion of the agent of the company who built that depot (the same above referred to), I wrote to the company suggesting the above specifications, by means of which that roof would have been warmed to a certain extent, and a part of that snow would have melted and run off as it fell.

I know that an iron roof is very heavy. I know that snow is very heavy. I know that both together are still more heavy. And hence I infer (although I do not know the fact from actual observation and experiment) that, by the application of heat to the roof of that depot at Saratoga, that snow would not have caused that roof to cave in.

Application of the subject of my discourse:—People who have iron roofs had better keep the snow off anyhow. People who have not iron roofs had better do the same. The cheapest and best way to do this is by means of the internal heat of the building, applied externally in a variety of ways, all of which are mechanically equivalent, and either of which may be adopted by the skillful mechanic, according to the peculiar circumstances of the case before him.

I do not positively know, but am inclined to believe, that conductors located inside of the building is a hazardous operation. Heavy losses have occurred in New York and Chicago from the bursting of these conductors inside. I guess it is safest to keep the water outside, and warm the conductors from the heated air or steam inside.

R. B. M.

UTICA, N. Y., Dec. 20, 1871.

Cold-water Engines.

MESSRS. EDITORS:—Being a constant reader of your valuable paper, I saw in a recent copy an article on cold-water engines as a motive power in cities, or for manufacturing where an elevated fountain-head can be had and where it becomes a prime object to use water economically.

There is now in operation in this town a water engine driven by a two-inch stream of water under a pressure of from sixty to seventy lbs. per square inch. It has been in operation for the last fifteen months, running the machine shop of Messrs. King & Mulock. Five lathes, one planer, one fan, two grindstones, and a circular saw, and emery-wheels are driven by it. The engine has a seven-inch cylinder and fourteen-inch stroke, and runs sixty revolutions per minute.

This engine is very simple, having only one valve, and can be shifted in a few minutes so as to use steam. The total cost of running this engine is fifty-five cents per day. Now, Mr. Editor, with such an engine as this, what is to hinder us from tapping Niagara Falls, or similar ones, and gaining all the power needed for all the manufacturing purposes in this country?

Nearly all cities and large towns are already supplied with water-works. Why not have their main pipes large enough to utilize the surplus water for this most economical of all the motive powers of modern times? I am sure, if you could but witness the working of this engine, you would agree with me in the conclusion that all the old water-powers are no more to be compared to this than the old stage-coach to the locomotive engine. The trouble with the water engines has been that they have never been able to get rid of their waste water. But with this engine there is no such difficulty. It runs as free as any steam engine, and cuts off the water at the end of each stroke.

I have seen a small one run 240 revolutions per minute. I can see no difficulty in making one large enough to work under falls of but a few feet, for you have only to increase the square inches in your cylinder and feed-pipe.

I think America, and our town even, may boast of excelling the world in cold-water engines. Yours, with respect, D. F. ROBERTSON, M.D.

MIDDLETOWN, N. Y., Dec. 19, 1871.

[There is probably no good reason why small water engines could not be used in cities, run by the ordinary water supply. Sewing-machines have been thus operated, and so have been the bellows of church organs. The plan of introducing the system at large has been advocated in more than one city. Our correspondent is in error as to there having been commonly experienced any great difficulty in getting rid of the waste water from a water engine. There should be no more trouble in this respect than with a turbine or other water wheel.—EDS.

Aerial Locomotion.

MESSRS EDITORS:—Although the balloon has, from its first invention, been the subject of many hopes on the part of scientific men, yet it is more manageable to-day than when first permitted to soar above the fair-grounds of Europe; and its use is still limited to mere ascension, instead of the free motion of the bird it vainly attempts to imitate. In the late Franco-Prussian war, the balloon was used to spy out battle-fields and to transmit despatches; yet the unmanageability of the contrivance was admitted and lamented by the scientists who noted their operation.

The very principle of the balloon militates against success. Its immense size when of any considerable lifting power must present so large a surface to any adverse air-currents, that the propelling force of any engine capable of being carried with it must be totally ineffective.

If we are to move at will through air, it is advisable that we calculate exactly the force required to do so, without any balloon or other buoyant assistance. Let us calculate how many pounds one horse-power can keep suspended in air without support.

Gravity draws a suspended body to the earth with an initial velocity of 16 feet in the first second of its fall; one horse-power equals lifting up 550 lbs. one foot in a second, or $34\frac{3}{8}$ lbs. 16 feet in a second; so that we have $34\frac{3}{8}$ lbs. as the weight which one horse-power can keep suspended in air.

Assuming this calculation to be correct, we can readily see why so many winged men, who have attempted to mount as on eagle wings, have fallen ingloriously to earth: their utmost strength could only keep up a small goose of five or six pounds. In this connection we may also refer to the immense muscular strength of birds capable not only of suspending themselves in air, but of rising and progressing through it, so that, if man were as strong, he should be—calling his weight 150 lbs.—as strong as six horses, or thirty-six times as strong as now. I am convinced, therefore, that, until science has achieved the construction of an engine that, with its fuel for two or three hours, shall weigh less than 30 lbs. per horse-power, aeronautics must remain stationary at their present position. As yet no engine of any kind has been made within any limits approaching these now required. J. S. H.

MONTREAL, Nov., 1871.

NEW AMERICAN PATENTS.

WE give, as follows, notices of some of the most interesting inventions for which Letters-Patents of the United States have recently been issued :—

FIRE PLUG AND HYDRANT.—A. F. Allen, Providence, R. I.—*Dec.* 26.—Aside from certain minor combinations of parts, the essential characteristic of this improved hydrant is found in the use of a delivery port, guarded by a controlling valve, which is incapable of being opened by the normal pressure of water from the mains, and which requires the application of draughting power from a pump to induce the delivery of water.

PAPER-BAG MACHINE.—J. Arkell, Canajoharie, N. Y.—*Dec.* 26.—Among the more important features of this machine for pasting and folding bag-bottoms is the combination of a drum or carrier for the blank, moving in one direction, with pasting and folding mechanisms arranged to successively paste and fold the material to be operated upon. Also, in the combination with the drum or carrier, on which the blank is held, of a creaser for creasing or indenting the blank, and folders to fold over the papers so creased in a direction contrary to that in which the blank is moving, in order to make the first fold. Also, rotary paste, which, arranged to automatically move up to and away from the carrier or jack-supporting surface, in combination with an automatic vibratory paster and a moving carrier or bed.

HORSE HAY-RAKE.—J. Comly, New York City.—*Dec.* 26.—In this apparatus is combined a swinging draught-frame, oscillating rake-head, and sliding rocking-bolt, with a swinging laterally yielding latch, disconnected from but released by the rocking-bolt. Also, the combination of the driving-wheel, a ratchet-ring thereon, oscillating rake-head, locking lever moving parallel with the axle, sliding-bolt, laterally yielding swing latch, moved by the locking-bolt, and a pivoted draught-frame, the whole so constructed and arranged that the locking-lever serves to disconnect the latch and rake-head at the same time—that is, connects the rake-head and toothed ring of the driving-wheel. There is also combined with the locking-lever, its socket, guide, and a suitable retaining spring.

HEEL FOR BOOTS AND SHOES.—C. H. Eggleston, Marshall, Mich.—*Dec.* 26—This new article of manufacture comprises a shaped heel veneered with hard rubber. The process of making it is by placing soft rubber about the heel, compressing it into shape by suitable dies, and hardening by subjection to the usual vulcanizing process.

SNAP-HOOK.—L. Morse, Attleborough, Mass.—*Dec.* 26.—This inventor claims, in a snap-hook having an inelastic tongue connected with the shank or body by means of a spring, which shall serve both as a hinge to the tongue and a spring to force and hold it up to the point of the hook, the spring as arranged between and extended into the tongue and body so as to be fully covered, and thus protected from injury thereby. Also, the snap-hook as made with its tongue and body composed of two bows struck or formed from plate-metal and soldered together, and the tongue next cut or separated from the body, and next reconnected therewith by a spring arranged in and fixed to the two.

BUTTER-TUB.—J. Gilberds, Jamestown, N. Y.—*Dec.* 26.—This package for butter and other articles consists of an interior wood part, an exterior sheet-iron part, and a wood and iron cover, the iron part of the cover being arranged to lap over the top of the iron part of the body of the package, to be soldered thereto or not, as may be desired.

TREATMENT OF PEAT FOR FUEL.—E. J. Hulbert and A. N. N. Aubin, Portland, Conn.—*Dec.* 26.—This invention comprises the combination, into a system of treating peat for fuel, of devices by which the crude material is dug up from its position in the swamp, deprived of its excess of water, carried to grinding machinery, elevated, divided, cleaned, and liberated from foreign substances, ground and puddled, molded, and spread upon the ground for drying by natural heat.

MACHINE AND PROCESS FOR MANUFACTURING PEAT FUEL.—T. H. Leavitt, Boston, Mass.—*Dec.* 26.—This process consists in first compressing crude peat to extract a portion of the water contained or held in it, next dividing up the compressed peat, and working or kneading the mass, either with or without the application of steam, heat, or water, and then compressing the peat so worked in suitable molds to extract more or less of its moisture, and form it into suitable blocks for fuel. Also, the treatment of peat in a pulping mill by injection into or upon it of inflammable material. The invention also consists in a system of machinery, having several novel features, for carrying into practice the said process.

DETACHABLE HAIR CURL, AND APPARATUS FOR MANUFACTURING THE SAME.—J. Mayer, Philadelphia, Pa.—*Dec.* 26.—This invention embraces a long curl having its coils made of comparatively short curled hair, mohair, or vegetable fiber, attached to and brushed spirally around a distinct and previously made padding, composed of short, straight, inferior hair, mohair, or vegetable fiber, with a cord fixed longitudinally through its center. A modification of the curl just mentioned and a curl-making device or apparatus are also covered by the claim.

LIQUID-MEASURING APPARATUS.—J. Schmidt, Vienna, Austria.—*Dec.* 26.—In this fluid meter is used a rotary cylinder, arranged within another cylinder, from which it is supplied and into which it discharges, an index mechanism being combined with the apparatus. The claim includes the combination of the two cylinders, the index mechanism, the supply pipe, and a suitably arranged two-way cock.

SPADE BAYONET.—W. S. Wetmore, London, England.—*Dec.* 26.—This device is constituted by the combination with a blade or shield and with a bayonet, of a sheath or handle, there being also employed an improved defensive plate and intrenching tool, provided with a socket having a prolonged section.

THRESHOLD.—E. Baker, Meriden, N. H.—*Dec.* 26.—This is a device for an adjustable threshold, with an independent movable section, capable of being elevated or depressed in whole or in part by the action of screws or equivalents. There is also applied in connection therewith a rubber packing appropriately arranged.

MACHINE FOR TURNING STONE.—J. D. Bounton, Leighton Crescent, Kentish Township, England.—*Dec.* 26.—The gist of this invention lies in the combination with a slide-rest of a discoidal cutter, which may be adjusted, and, when brought in contact with a moving block of stone, will reduce or shape the latter.

NEEDLE-THREADER AND SPOOL COMBINED.—G. P. Farmer, Brooklyn, N. Y.—*Dec.* 26.—This is a needle-threading device attached to or forming part of the spool, and so constructed as to enable a needle to be threaded either with loose thread or with thread attached to a piece of work.

ELECTRO-MAGNETIC APPARATUS.—G. Little, Rutherford Park, N. J.—*Dec.* 26.—In this apparatus an oscillating armature and two helices are connected to the main line, and used in combination with a local current connected with one of the helices. The invention also includes an oscillating armature upon a fulcrum connected with the cores of two electro-magnets, in combination with two electric currents connected with the helices of said magnets. A supplemental combination of devices is covered by an additional clause of the claim.

TURBINE WATER-WHEEL.—M. W. Obenchair and J. J. Obenchair, Logansport, Ind.—*Dec.* 26.—This turbine consists of a conical body, a ring, and flanched ovoid buckets, having their centrifugal discharge beyond the vertical plane of the inlet, and surfaces gradually increasing in curvature from the inlet to the junction with the ring, and terminating in full semicircular or elliptical outlet lips lying nearly in radial planes.

DISINTEGRATING WASTE VULCANITE RUBBER.—J. H. Smyser, Pittsburg, Pa.—*Dec.* 26.—This process embraces the comminution of waste vulcanized rubber or caoutchouc, by subjecting it to the abrading action of burr or grind stones, emery, sand, or glass belts or wheels.

LUBRICATOR FOR RAILWAY AXLE-BOXES.—John S. Sanson, Morrisania, N. Y.—*Jan.* 2.—This invention is fully described and illustrated on another page of this paper.

WHEELS AND PULLEYS.—W. D. Grimshaw, Ansonia, Conn.—*Jan.* 2.—This invention consists in a novel construction of wheels and pulleys, by forming them or their bodies and rims in two main parts, out of elastic sheet-metal plates struck up in suitable dies or otherwise to form dish-shaped elastic disks, the one smaller than the other, and so that, on arranging them with their hollow sides face to face, the smaller dish-shaped disk which constitutes the one side of the wheel or pulley is caused by a flanged construction of it to rest concentrically within and against the other or larger disk that is constructed to constitute both the opposite side or face of the wheel or pulley, and tread or rim thereof; also, in case of a railroad car or other like wheel, the flange thereof. And in this connection the invention further consists in such a construction of the dish-shaped disks as that the smaller disk is made self-centering within the larger one, by causing its flange to rest upon a beveled or curved surface formed within the larger one. Wheels or pulleys constructed according to this invention may be made cheap, and combine lightness with strength, and, when made of steel, possess a large and almost universal elasticity.

GUIDE AND CLEANER FOR WINDING MACHINERY.—John Fullan, New York City.—*Jan.* 2.—This invention is applicable to winding and spooling machinery generally. It consists of a pair of elastic fingers formed of a bent wire pivoted to the traverse bar below, and with its ends arranged to spread outwards or laterally above, in combination with caps or sleeves, formed of woolen cloth or other suitable material, fitted or slipped over the fingers, and between which the thread to be guided and cleaned is passed. A guide and cleaner thus constructed provides alike for variation in the run of the thread between the clothed fingers at different heights to suit the winding of it on a spool or otherwise; likewise, of a lateral adjustment of it to secure uniform winding; and, as a cleaner, admits of a ready renewal of the clothing, and is generally cheaper, simpler, and more efficient than other clothed guides or combined guides and cleaners as heretofore constructed.

RUBBING APPARATUS FOR MEDICAL PURPOSES.—George H. Taylor, New York City.—*Jan.* 2.—This invention relates to a rubbing apparatus for medical purposes, in which two or more oppositely arranged rubbers having a reciprocating motion simultaneously in reverse directions are used for operation upon the limb or portion of the body disposed between them; and the invention consists in a combination with said rubbers or rubbing surfaces, of certain mechanism for actuating and controlling them, including a pressure lever capable of graduation as to its load, and which may be governed by a spring, weight, or manual force to regulate the frictional action of the rubbers.

"Sugaring Off."

PROF. SCHELE DE VERE has written a book on "Americanisms," and the New York *Times* has criticised it. Here is what is said of a term derived from a Northern industry. Says the professor :—"The verb 'to sugar off' is derived from the custom of eating the maple sugar as it is poured off in its hot state," etc. To this the critic indignantly responds :—"Nothing of the kind. 'To sugar off,' as it would seem that any one must know, is to wind up the sugaring, to stop the sugar-making for the season."

Neither the "professor of modern languages in the University of Virginia" nor the pugnacious pundit of the *Times* seems to be aware that sugaring off' is simply the process of slow evaporation, by which the crystallized sugar is obtained from concentrated maple sirup. In a large sugar-bush the product will be sugared off a score of times before the close of the season. The sugar "eaten as it is poured off in its hot state" is termed "wax" by farmers, and is obtained by pouring the hot sirup, just before it reaches the crystallizing point, upon snow, to cool it rapidly.

A GROCER at Lowell, Mass., has a sagacious dog who never sees anything being weighed on the scales without putting one foot on the platform, and then innocently looking out of the door.

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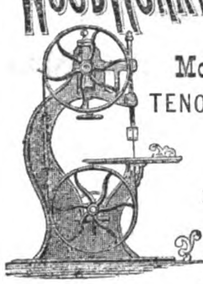

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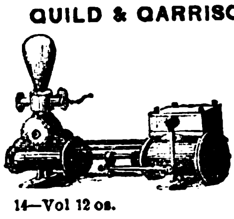

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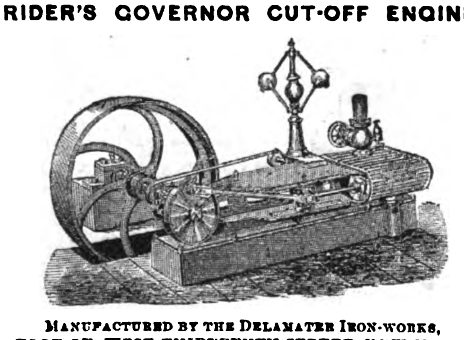

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VOLUME XIV. New Series. } NUMBER 3. NEW YORK, JANUARY 17, 1872. { $2 00 PER ANNUM IN ADVANCE. SINGLE COPIES, FIVE CENTS.

CONTENTS OF THIS NUMBER

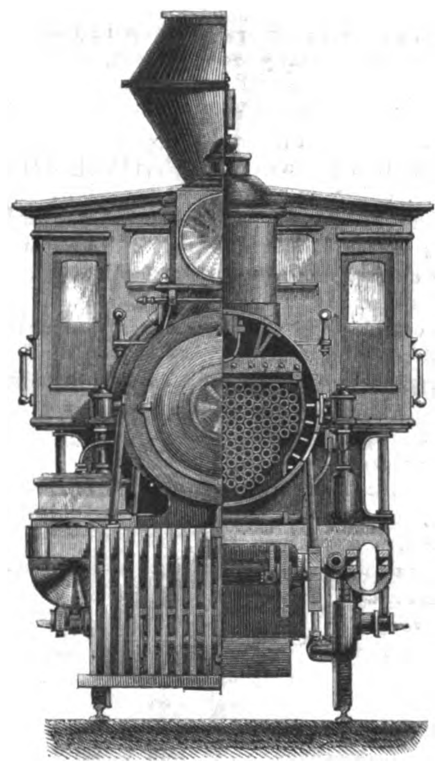
[Illustrations are indicated by an asterisk.]

A Crack in the Great English Gun.

THE steel lining of the 35-tun gun has cracked, and why is a mystery which puzzles many people. The pressure proper to the 120 lbs. charge of pebble powder employed is only 30 to 40 tuns on the square inch, whilst that actually realized was 66 tuns on the square inch. As the steel lining was estimated for 50 tuns only, it naturally gave way at the weakest point, viz., the rifling. This latter consists of nine grooves, each 1½ inch wide, 2 inches deep, and 135 inches long, whilst the effort of rotation is concentrated upon one point in each groove by use of a driving-ring of metal studs in the projectile. It is supposed that this concentration of rotary effort on such small points of a projectile 33 inches long, and 700 lbs. in weight—about three shot to a tun—squeezed up the soft studs, or wrenched them from their sockets, causing a momentary jam, which allowed a greater consumption of powder than was due to the movement in the bore, and thus led to the extraordinary pressure in the powder chamber. Similar cracks have unaccountably taken place in other guns firing studded projectiles, but we have only recently had the means of correctly recording the pressures, and the material of the guns has been blamed for that which is due to the rifling. The steel tube of the original 7-inch gun with this rifling was still more destructively cracked, and the gun was ordered to be fired "under precaution," whilst the corresponding gun with a long bearing iron-ribbed projectile, distributing the effort of rotation along the whole length of the cylindrical portion of the shot, did its work well. Indeed, the difficulty which the 7-inch studded shot had in getting out of the gun was so great that it required one-fourth more powder to drive it out at the same initial velocity as the long bearing iron-ribbed projectile. The grooving for this latter is about half as wide and three-fifths as deep as that required for the stud, and, as the bearing in each groove corresponds with the length of the cylindrical portion of the shot, five grooves would suffice to do the work of nine for the studs. We believe that the cost of a 35-tun gun is about £2,500, and that of relining it about £700, so that the squeezing of a stud, or the wrenching of one out of its socket, is a somewhat expensive accident. And though this doubtless often occurs without creating such an enormous powder pressure, yet it can rarely do so without affecting the flight of the projectile.—*The Engineer.*

STANDARD LOCOMOTIVE.

THE American locomotive differs materially from the European type, inasmuch as the exigencies of our railway undertakings have limited us to a far less substantial permanent-way than that which ordinarily obtains abroad. The less favorable condition of our tracks must therefore be compensated for by special adaptation of the engine, and the manner in which this has been for many years successfully carried out has made the American locomotive one of the most perfect pro-



ducts of mechanical engineering in the world, and insured not only its success on our own fifty-odd thousand miles of railway, but in South America and elsewhere has enabled it to more than hold its own with the best of European manufacture. We present on this page a transverse sectional view, and on page 40 a longitudinal section, of a standard locomotive, 16 by 24 inch cylinders, made at the Baldwin Locomotive Works, Philadelphia, and which affords a fine example of the important class of motor machinery of which we are speaking. Its construction in detail will be fully understood from the appended specification, which, with the engravings, we take from the *Railroad Gazette*:—

"The engine is an eight-wheeled road locomotive, having four coupled wheels, and a four-wheeled swing bolster truck. It has cylinders 16 inches diameter and 24 inches stroke. Drivers, 60¾ inches diameter. Gauge, 4 feet 8½ inches. Fuel, wood or soft coal. Weight of engine in working order, with fuel and water, about 65,000 pounds; about 41,000 on drivers. Total wheel-base, 21 feet 9 inches. Rigid wheel-base, 8 feet. General design illustrated by the engraving. The boiler is of the Pennsylvania cold-blast charcoal iron, ⅜ inch thick; all horizontal seams and junction of waist and fire-box double-riveted. Boiler to be well and thoroughly stayed in all its parts, provided with cleaning-holes, etc. Waist, 48 inches in diameter at smoke-box end, made straight and with two domes. Flues of iron with copper ferrules on fire-box end, 144 in number, 2 inches in diameter, and 11 feet 5 inches in length. Fire-box 66 inches long and 34½ inches wide inside, 63 inches deep, of best homogeneous cast-steel; side, crown, and back sheets five-sixteenths inch thick; flue-sheet, ½ inch thick. Water-space 3 inches sides and back, 4 inches front. Stay-bolts, ⅞ inch diameter, screwed and riveted to sheets, and not over 4½ inches from center to center. Crown-bars made of two pieces of iron 4½ inches by ⅝ inch, bearing on side sheets, placed not over 4½ inches from center to center, and secured by bolts screwed through crown, with nut on, and riveted over. Grates, cast-iron. Ash-pan with double dampers. Smoke-stack, diamond pattern. The cylinders are placed horizontally; each cylinder cast in one piece with half saddle; right and left hand cylinders reversible and interchangeable, accurately planed, fitted, and bolted together in the most approved manner, and the pistons are fitted with two brass rings babbited. The guides are of iron, case-hardened, fitted to guide-yoke extending across. The valve motion is the most approved shifting link-motion, graduated to cut off equally at all points of the stroke. Links made of the best hammered iron well case-hardened. Sliding-block 4½ inches long with flanges 7 inches long. Rock-shafts of wrought-iron with journals 3½ inches diameter and 12 inches long. Reverse shaft made with arms forged on.

"The driving-wheels are four in number, 60¾ inches in diameter. Centers of cast-iron, with hollow spokes and rims, and turned to 56 inches diameter to receive tires. Tires of cast-steel, all flanged, 5½ inches wide and 2⅝ inches thick when finished. Axles of hammered iron; journals 7 inches diameter and 8 inches long. Wrist-pins of cast-steel. Springs of best quality of cast-steel. Connecting-rods of best hammered iron, furnished with all necessary straps, keys, and brasses, well fitted and finished. Equalizing beams of most approved arrangement, with steel bearings. The frames are of hammered iron, forged solid. Pedestals cased with cast-iron gibs and wedges to prevent wear by boxes. The feed-water is sup-

(*Continued on page* 40.)

CAR PROPULSION BY PNEUMATIC POWER.

BY JAMES A. WHITNEY, MECHANICAL ENGINEER.*

LONG after the success of Stephenson's engines was assured, and the superiority of locomotive traction to that of ropes actuated from stationary engines fully demonstrated, there were not wanting projectors and engineers who sought, at much cost of invention and of money, to substitute the now universal mode of railway propulsion by one in which the traveling motor should be dispensed with. Nor were these without plausible argument, nor have their efforts, unfruitful in their time, been unproductive of much that may be of value now and hereafter. The original cost of a locomotive, as compared with that of a stationary motive power, is approximately as five to one; it requires a fireman as well as an engineer, while an ordinary stationary engine is well cared for by a single attendant; it cannot ascend steep grades, and in wear and tear is subject to rapid and often to dangerous deterioration, even with a degree of attention which with most fixed engines and steam-generators is unusual. Add to this that the economy of fuel is much greater with the latter than the former, and that fuel of poorer quality may be used, and there is good reason apparent for the numerous plans for transferring the power derived from the steam-engine by some other agency than that of direct connection by pitman, crank, and axle. Foremost of these projects has been that of using atmospheric air under pressure, which has been proposed in many different forms. In open country and in direct competition with the locomotive system, it came to grief in every instance. This was not wholly a result of any engineering or mechanical objection—although such were not wanting, for a line between Paris and St. Germain was open to passenger traffic for a period of fourteen years—but on the score of expense, which was found excessive.

But it must be remembered that the experiments commonly held to have settled the impracticability of the system were prosecuted under conditions the most favorable to steam locomotion as ordinarily defined. In the exigencies, however, of the present as concerns passenger traffic in large cities, circumstances are wholly changed. On account of noise, of smoke, of the frightening of horses, and of uncomfortably heating the vehicles in summer, steam cannot be used to advantage on city or street cars; neither, for several of the reasons just noted, should its use be attempted in tunnels; neither, on account of the vibrations incident to a locomotive, should such be allowed on elevated ways, in which the permanent stability of the supporting structure must largely depend on the absence of disintegrating causes like that just mentioned, and on which the dangers of leaving the track, of collisions and the like, would, under the stress and crowding of city transit, be largely in excess of those experienced on common railways. It is acknowledged that horse-power is already inadequate to the needs of New York City street railways; the transmission of power by wire ropes, as illustrated in the elevated railway on Greenwich Street, has proved a mediocre and insufficient method of propulsion; and in pneumatic power alone does there appear to be promise sufficient to justify the outlay that will be required in thoroughly testing any improved system of propulsion. We use the term improved as distinct from the term new, for the plans which offer the most of utility are in their essential principles quite old, some older than the locomotive itself, and the modifications which will render them practicable will, quite likely, be in themselves very slight. But the importance of little things cannot be overestimated in adapting an engineering principle to actual use. It was the adoption of the grooved rail, permitting the flanges of the car-wheels to keep them on the track while the surfaces of the latter lay flush with the street surface so as to offer no impediment to ordinary vehicles, that rendered street railways practicable. Had it been attempted to retain the T-rail, the city tramways, enabling two horses to draw five times as much as the team of an omnibus on a Broadway pavement, would not, as they have done, gridironed every large city in this country, made their way as an evidence of American enterprise into the capitals of Europe, and trailed their iron length along the streets of Stamboul, as it is stated they are now about to do. A careful working out of the details in the apparatus employed, the adaptation of one or the other variety of pneumatic propelling mechanism to the precise conditions most favorable to its success, and the application of more efficient means in the prosecution of the work than was possible with the inferior workshop practice of forty years ago, will, we have faith, bring about a practical change in city and suburban locomotion ultimately valuable in every city in the civilized world having more than fifty thousand inhabitants. To suggest methods by which, as the writer believes, this may be most readily and effectually brought about, is the object of the present paper.

Propulsion by pneumatic pressure may be properly divided under three heads, viz., that embracing the driving of a car or carrier bodily through a tube, either by an air-blast behind it, or by pressure induced in rear by a partial vacuum in front; that in which a piston, operated in the same manner as in the former, but in a tube of smaller diameter, is connected to a car running on rails outside; and that in which air under compression is admitted to engines in lieu of steam, the engines being thus actuated to turn the wheels of the vehicle by appropriate connections. In the first, a low pressure acting on an area if anything larger than the cross-section of the car is used: its greatest disadvantage is that, as hitherto applied, the car has been projected in darkness through a subterrene tube, reliance being had mainly upon artificial illumination. The second requires a comparatively high pressure, acting upon an area proportionally smaller than the car section, and the cause of its failure after long trial was the leaking of the longitudinal valve, whereby connection was allowed between the piston and the car arranged externally. The third is simply the use of air springs, in which power is stored by compression, to be slowly given out as the air is passed to and through the engine cylinders: among the objections attending its use is the difficulty of maintaining a uniform pressure in the supply to the engine; but of much more practical importance is the liability to freeze, induced in the engine from the heat rendered latent by the expansion of the air. These, the just enumerated principal defects incident to each modification of the pneumatic system, do not seem, in either case, to be beyond the reach of remedy, but in none does the theory or practice of such remedy appear to have been properly wrought out with special reference to the peculiar needs and conditions of city passenger transit.

The several varieties of pneumatic propulsion appear to have grown out, as it were, one from another, in a kind of natural sequence. It is sixty-one years since James Medhurst, in England, proposed to drive cars by an air-blast through a brick tunnel, furnished with longitudinal ledges to support the rails upon which the car-wheels were to run: it is presumed that the air-current was to be produced by an apparatus similar to the blowers used in iron furnaces of that time. Fourteen years later, James Vallance patented a plan in which the air was to be exhausted in front of the car, and from the two it was but a step to combine them in such manner as to secure a maximum of speed. Apparently reflecting upon the evident objections to a tunnel railway, Medhurst, in 1827, seventeen years from the date of his first project, planned what is really the germ of the second sub-system. This comprised a tube submerged throughout its length in water, and with an opening longitudinally in its under side, from each edge of which flanges projected downward, so that a water lute of several inches depth was provided to the opening. A piston, propelled by atmospheric pressure, was to traverse within the tube, and, connected by a thin metallic blade or bar with the train upon the external track above, would propel the same. The idea, impracticable in this form, was taken up by Henry Pinkus, who made the longitudinal opening in the upper part of the tube or main, and placed in appropriate relation thereto a flexible rope to serve as a valve. As the piston—moved by the pressure behind, obtained by the action of air-pumps exhausting in front of the piston—moved forward, it lifted the rope or valve to permit the passage of the colter or connection between the car or cars outside and the piston within. Although the external pressure of the air upon the valve was calculated to keep the latter in place, it was found to leak badly, and the plan amounted to nothing. In 1839, Samuel Clegg patented, in England, a valve adapted to the longitudinal slot of the tube, and remarkable for the ingenious adaptation of its structure to the end proposed. The valve was "made of a double strap of leather or raw-hide riveted between two iron plates, the top plate wider than the slot or opening, and the lower one falling into it when the valve was closed, thus completing the cylindrical form of the interior of the pipe, which had been destroyed by the aperture cut in it." One edge of the leather was allowed to rise, the other being screwed down firmly to the surface of the pipe. The lifting edge lay, when closed, against a composition of beeswax and tallow, placed on the edge adjacent and serving as a solder. The leading carriage of the train carried a trough filled with burning charcoal, and having a blade of copper projecting downward from it. This blade, being kept continually hot, and coming in contact with the valve after the passing of the colter, melted the waxy composition, and cemented the lifting edge of the valve firmly to its seat, thereby hermetically closing the tube to provide for the passage or propulsion of the succeeding train. Samuda combined with this a method of dividing the tube into sections of any desired length, and separated from each other by valves. These valves were actuated each by contact of the leading car on an external lever connecting with the pivotal bearing of the valve. This enabled a vacuum to be maintained separately in each section to propel the train its entire length, without interference with the movement of a train on any adjacent section. Means were also provided for stopping the car by air cushioned in the end of each section on the closure of the valve, independent of the move

* Paper read before the New York Society of Practical Engineering, Jan. 3, 1872.

ment of the train. Such was the construction of the celebrated atmospheric railway of thirty years or thereabouts ago, lines of which were laid, as previously intimated, in France, between Paris and St. Germain, and in Ireland between Kingston and Dalkey, and which, in one instance where the leading vehicle of a train became accidentally detached, showed its capability of propelling a single car at the rate of seventy miles an hour.

The difficulty of keeping the tube or main, with its longitudinal valve, in perfect working order, having been quite manifest in the comparatively successful experiments of Clegg and Samuda, and much more so in those of Pinkus, it was natural that some appliance other than the valve should be sought for in order to communicate pneumatic power from the stationary engine to the traveling car. It was doubtless this that, in 1844, led Pierre Armand Fontainemoreau to propose a pipe or main laid lengthwise of the track, and either kept filled with air under pressure or subjected to the action of an air pump to maintain therein a vacuum more or less complete. In the former case the main was to be furnished at intervals with valves opening inwards. The locomotive was provided with two cylinders properly arranged in relation to the driving axle, and furnished with devices which automatically operated the valves in the main to supply the cylinders with compressed air, in the same manner as those of an ordinary locomotive are supplied with steam from the boiler. In the event of using a vacuum in the main, the action of the engines was simply reversed, air being exhausted from in front of the pistons, so that the latter would be operated by the direct pressure of the atmosphere. So far as we know, no practical trial of this was made, but with the addition of a tank to receive a supply of compressed air in lieu of feeding the engines direct from the main, Fontainemoreau's plan might stand as the type of one of the subdivisions of the third class of pneumatic motors; for this class includes three sub-systems—that in which the air is compressed in a main extending the whole length of the line, and calculated to supply the air to the locomotive tank automatically and without stopping the train; that in which a similar main is proposed, but the cars stopped for the temporary connection of the tanks; and that in which a separate compressing power and compressed air-reservoir is provided at every station. The first of these, from its theoretical completeness, is apt to please the fancy of projectors, but from the extreme accuracy required in the fittings will probably never prove practically successful. The second has the merit of concentrating the power in few places along the route, and of requiring but a minimum of attendance, but involves the necessity of keeping an extremely great volume of air constantly compressed. The third—although multiplying the number of engines and reservoirs—will, all things considered, probably meet with the most favor when this method of storing up power for car propulsion is tested as its merits, theoretically at least, deserve.

To be continued.

THE business statistics of St. Louis for the last year are as follows:—Number of steamers arrived, 2,565; number of barges, 1,165; amount of freight received, 880,346 tuns; number of steamers departed, 2,580; amount of freight shipped, 773,179 tuns.

BARROW, Lancashire, England, has now a hydraulic crane which will lift 100 tuns.

Personal.

THE Hon. William J. McAlpine, formerly New York State Engineer, has returned. He was invited by the Austrian Government to examine the mouths of the Danube, and if possible to devise and mature a plan for the improvement of the navigation of the various outlets of that river. He has been for the past seven months engaged in making the necessary surveys, and perfecting his system. His plans and specifications have met the approval of the Austrian Government and the municipalities having joint jurisdiction of the outlets of the Danube, and also of the financial representatives interested. Mr. McAlpine will, in a short time, return to Europe, taking with him a corps of American engineers, and prosecute the undertaking as rapidly as possible.

A Big Clinker.

PROBABLY the biggest clinker ever known in the history of man is that now in the cellar of a formerly extensive stove store on River Street. About 9,000 stoves were melted down by the great fire into one mass, which, gathering into it an immense quantity of bricks and stones, presented, when cooled off, one of the most formidable masses of *débris* occasioned by the fire. Every endeavor to break it up by any ordinary means having failed, one of Fox & Howard's immense pile-drivers was employed for that purpose, but even its huge hammer has so far, after four weeks' hard work, proved ineffectual. The hammer of the first "driver" has been completely smashed up in its vain endeavor to conquer the stubborn clinker, and now a new machine of this character has been set to work. It must be several weeks yet before this obstruction to rebuilding can be removed. Chicago is ahead yet on clinkers.—*Western Rural.*

Improved Spark-arrester.

AN efficient spark-arrester for locomotives has long been an acknowledged *desideratum*, and the projected improvements in this line have not been few in number. Mr. Luke F. Townrow, master-machinist D. L. & W. R. R., has devised an appliance of this character, for which a very high degree of superiority over others of its class is claimed. The smoke from the chamber, in rear of the tubular flues of the boiler, passes through slats adjustable in size to the smoke-stack, which latter is furnished with a screen or diaphragm of wire-cloth; the whole arrangement being such as to prevent the escape of the sparks with the draught, and thereby avoiding a very great as well as a very common source of inconvenience.

Denver and Rio Grande.

THE Denver and Rio Grande Railway Company have ordered three sample freight-cars of a new pattern, and trucks and wheels from Philadelphia, and will shortly begin manufacturing their cars at their shops in West Denver, where they have put up and ready for use all the necessary material.

The Stevens Battery.

THE Stevens Battery, which was willed to the State of New Jersey by the late Edwin A. Stevens, has been completed as far as it can be until it is launched and placed upon the dry dock. Work has been suspended except so far as it is necessary to keep the battery in condition. Nothing further will be done until the question is settled as to what disposition is to be made of it by the State authorities.

Ohio Iron.

A COMPANY of Scotch capitalists have recently purchased 500 acres of land in Tuscarawas County, Ohio, containing deposits of black-band iron ore, from 3 to 13 feet in thickness, for which they paid $150,000. The ore is said to be of the same description as that which forms the basis of the iron industry of Scotland. Four furnaces are to be immediately put up by this company, and a large manufacture of pig-iron will be begun. The land is on the line of the Lake Shore and Tuscarawas Valley Railroad, now in course of construction from Cleveland to Dennison, a station on the line of the Pittsburg and St. Louis Railroad.

THE center of gravity of population is a term adopted by calculators of statistics, derived from the census returns of the United States to express briefly the following idea:—Supposing the country to be a plane surface loaded with inhabitants distributed over it in the manner shown by the census, the center of gravity of the population would be the point upon which the plane would balance. This point, in 1840, was near the eastern foot of the Cumberland Mountains in Virginia, upon the thirtieth parallel of latitude. In 1850, the center had moved westward fifty-seven miles to a point south of Parkersburg, Va. In 1860, it had moved eighty-two miles further west, to a point south of Chillicothe, Ohio, and not far from the boundary line between Virginia and Kentucky. The census of 1870 shows that the center of gravity of population has moved forty-five miles further west, and is now at Wilmington, Clinton County, Ohio. It is estimated that in thirty years the center will be found near Bloomington, Ind., about forty miles southwest of Indianapolis.—*Public Ledger.*

POTASH FROM SALT WELLS.—The suggestion is made by the Bureau of Agriculture that the salt wells of this country will be found on examination to contain potash, and that an important industry may be created by manufacturing that substance in a condition fitted for agricultural and chemical purposes. Such a manufacture has grown up within a few years at the Stassfurt salt works in Germany, the amount produced in 1870 being 30,000 tuns of the muriate.

ACCORDING to *Nature*, a small place to be marked soon as a big one is Chimbote, on the coast of Peru. Its harbor, the finest in the South Pacific, can shelter the navies of the world. It was a great town in the time of the Incas, as remains of a colossal aqueduct will show. Near it are coal mines. It has been abandoned and neglected on account of the difficulties of access, but a railway is now to be constructed to the fertile interior at a cost of $32,000,000.

BRITISH RAILWAYS.—A few figures from the railway returns of Great Britain will not be without interest. At the close of the year 1860, there were 10,433 miles of line open in the United Kingdom; at the close of 1870, the number of miles constructed was 15,537, showing an increase of nearly 50 per cent. In England (including Wales), the increase in the ten years was from 7,583 miles to 11,043; in Scotland, from 1,486 to 2,519; in Ireland, from 1,364 to 1,975.

ROSIN THE BOW.—The violinists of Vienna and other Continental capitals are using liquid colophony instead of solid rosin. The mixture, applied with a camel's-hair brush, is said to injure neither the bows nor the strings, and to last 100 hours' playing. It is also stated that the strings give out a clearer tone than when solid rosin is used.

GREAT ANCIENT IRON FORGINGS IN HINDOSTAN.

FROM an interesting article by Robert Mallet, in the latest issue of the *Engineer*, we abstract the following concerning examples of ancient iron-working in India, on a scale strongly in contrast with the present slender appliances of that industry now available in that country:—

"The Hindoo furnaces are frequently not larger than a chimney-pot, and hours of incessant toil are sometimes required to produce a few pounds weight of iron. This may be taken as a rough account of the *present* state of iron-working in India. But without going back so far as 'time immemorial,' the facts now to be adduced prove it to be a very incomplete, or rather inaccurate, view of the history of iron-working in India only a few centuries back.

"Within the cincture of the ancient mosque of the Kutub, situate near Delhi (so named from the celebrated and grandly lofty Kutub minar forming part of the mosque), and not far from the principal gate, exists a wrought-iron pillar, the form and surroundings of which are illustrated on the preceding page, the engraving being copied from a photograph in the writer's possession. This wrought-iron pillar is as large as the screw-shaft of one of our first-class steamships, and a forging of the same size would be deemed a piece of first-class work for any one of our great steam-hammer forges in Europe, and yet it *is more than a thousand years old, and may be as much as fifteen hundred.* Its form is either that of a conic frustum or of some curvilinear spindle, giving it a very slight swell towards its mid-height. The capital consists of an elaborate Indian design, the whole of which good observers deem to have been carved by the chisel out of the solid iron. The shaft to near the present ground level is beautifully smooth and true, and presents the character of having been 'swaged,' or if not, 'sledge planished' to its finished form. The lower part for three feet or four feet above the present ground and below it is rough and but carelessly rounded; there appear to be some rather large cavities in this part of the shaft. This pillar has been known to Europeans for many years. 'The total height above ground is 22 feet, that of the capital, represented in the accompanying engraving, 3½ feet, and that of the rough part near the ground the same. But its depth under ground is considerably greater than its height above ground, as a recent excavation was carried down to 26 feet without reaching the foundation on which the pillar rests. The whole length of the iron pillar is, therefore, upwards of 48 feet, but how much more is not known, although it must be considerable, as the pillar is said not to be loosened by the excavations. I think, therefore, it is highly probable that the whole length is not less than 60 feet. The lower diameter of the shaft is 16·4 inches, and the upper diameter is 12·05 inches, the diminution being 0·29 inches per foot. The pillar contains about 80 cubic feet of metal, and weighs upwards of 17 tuns.'

"There may be some doubt as to the correctness of the great depth under ground assigned here, but the dimensions above ground seem reliable, and agree with the photograph, and are from actual measurement. The total weight assigned seems somewhat in excess, even on this author's assumption as to length. An inscription of six lines exists on the pillar itself, about half-way of its height, which records in fact all that is known as to its history. Of this Captain Burt (*ut supra*) gives the following account:—'The principal inscription on the Delhi iron pillar is in Sanscrit, the character that form of Nagari which has been assigned to the third or fourth century of the Christian era . . . . the curves of the letters being squared off, perhaps on account of their having been *punched* upon the surface of the iron shaft with a short *cheni* (punch) of steel and a hammer, as the actual engraving of them would have been a work of considerable labor.'

"The date of its production is fixed by the inscription as the third or fourth century, A.D. Its form and chief dimensions are before us. Now, what is the material of the pillar, for upon this depends the nature of the processes by which it must have been made: is it of cast-iron or of wrought-iron? As to this the evidence is as yet not absolutely decisive. Some have supposed it to be of cast-iron: but Captain Burt, who appears to have had some practical knowledge, obviously deems the pillar to be of *wrought or forged iron*, and supports that opinion by his ingenious and practical remarks as to the punching on it of the inscription. This latter view receives the following corroborations: Mr. James Fergusson, F.R.S., who has carefully examined the pillar, is clearly of the opinion that it is of forged iron. A fragment of it has been recently sent to England, and the writer is informed, on, he believes, good authority, that Dr. Percy has heated and drawn out upon the anvil a portion of it, and considers it to be *forged iron*. This test, probably all that so small a specimen admitted of, is not absolutely conclusive, as Dr. Percy himself would no doubt admit, for some cast-irons, especially those made from hematites with charcoal fuel, admit of being heated and at once forged and drawn out hot into a sort of wrought-iron. The photograph, as examined with the lens by the writer, presents to the practical eye several minute characteristics which incline him to believe it to be forged and not cast iron.

"We are thus obliged to consider that this pillar is *not a casting*, but is a huge forging in native Indian or some other Asiatic-made *wrought-iron*, and, if so, the question arises, how was it forged? We have no evidence that 'blooms' of more than 90 lbs. or 100 lbs. each were ever made by Indian methods: these would be too small to build up singly into a bar of 16 inches diameter. It is, however, conceivable that such little 'billets' as were procurable from such blooms might be welded up into bars, and these bars made into a fagot, out of which such a bar, by *sufficient means* for bringing it to a welding heat, and for then hammering it, might be welded into a cylindrical bar such as that of this iron pillar.

"Now, the limit to the size of a fagot that can be welded with given means of *heating it*, is found to be when the mass is so great in proportion to the power of the furnace that the exterior of the mass, where the heat is being applied, oxydates and melts away, owing to the slowness of heating and hence long continuance of exposure to the heat, as fast as piece after piece is laid on to make up for the waste. This limit has been reached before now even in our best reverberatory forge furnaces; it actually was touched upon at Liverpool, in forging the Mersey Company's great 13-inch gun. Unless, therefore, the iron-working of India between the third and fourth century A.D. possessed air furnaces and lofty stalks, or blowing apparatus of some sort upon a scale now unknown, and indeed not conceivable in any form of native apparatus, we may confidently affirm that no fagot to form a welded bar of 16 inches diameter could have been by any possibility brought to the welding heat at all, or without such waste as to prevent its ever being forged.

"If we pass from the heating of such a bar to the forging of it, our difficulties are still greater. The limit in size of *hand forged* work in Europe was about reached in the production in days gone by of the heaviest 'best bower' anchor of a ship of the line. The largest section of the anchor shank when welded to the arms was about eight inches or perhaps nine inches across, and the welding was effected by the blows of twenty-four 'strikers' trained to strike in time, and swinging 14 lbs. to 18 lbs. sledges. The shower of blows dealt for some minutes' spell upon the mass of iron of this large section produced a very insignificant effect, so that both the fagoting and the welding of such anchors were often very defective, and the strikers having to stand close in a ring, within the short distance for swinging the sledge from the glowing iron, were greatly scorched by its radiated heat, and some with fine skins were unfitted for the work. Hereabouts, then, the limit to hand forging was reached, both as to the power of the hand sledge to act upon the mass of iron, and as respected the power of the men to endure the heat radiated from the glowing iron at the short distance from it limited by the length of the handle of a sledge when swinging. Now the section of the shank of a 'best bower' of eight inches or nine inches diameter is to that of the Delhi iron pillar about as 64 to 201, or the latter would radiate from its heated extremity more than thrice as much heat, and an equal length more than thrice as great a mass to be dealt with by the sledge hammer, as in the case of the anchor. We may, therefore, affirm that even in European hands a bar of wrought-iron of 16 inches diameter could not be welded up by hand labor with the sledge. The latter would produce no adequate impression —least of all in the comparatively feeble hands of Asiatics—and human skin and muscles could not withstand at five feet or six feet off the intolerable glare and scorching of such a mass heated to the welding point. How, then, was this Delhi pillar forged in India, even assuming that some means for heating it existed? Forging by power in some form, of course, suggests itself, but upon what source of power can we even speculate? Human muscles, and the 'bullock walk' by which the water skins, or 'bheesties,' are drawn up from the wells or tanks, appear the only present sources of power in India. The water-wheel, or *noria,* for *raising* water by the application of such animal power, is common; but the production of power by the *descent* of water on a wheel seems never to have been known in India, where, indeed, except in the hill districts, no 'falls' for water-power exist. The windmill, though said to have been

known in Persia from some very remote period, has never been seen in India, and it need scarcely be said steam-power is out of the question.

"It is barely imaginable that some form of falling tup hammer raised by men acting on ropes, after the manner of the old ringing engine for pile-driving, may have been employed, or some rude form of tup or tilt hammer moved by bullocks acting on a walking wheel; and it is for Indian archæologists to discover if there be any records or traditions of such appliances, without which the methods by which this huge pillar was forged must remain inexplicable. The pillar itself stands before us, so far, a metallurgic enigma; if it stood alone, and were this great ancient forging in wrought-iron alone known to exist in India, we might pass it by, content to suppose it too isolated an instance on which to found any conclusions as to the iron metallurgy of that country in former ages; but, although little noticed, and apparently quite unknown to our European writers on iron metallurgy, this pillar does not stand alone.

"From other sources, we have the fact that at Delhi in the north, and at Madras in the far south of India, massive forgings exist, such as all Asia, so far as we know, could not produce at the present day, and of a size rivalling those upon which Europe to-day prides itself. The earliest of these dates from the third or fourth century, and the latest from the eleventh to the fourteenth centuries of our era. With such an interval in time as 900 or 1,000 years, and such a diffusion in space as from north to south of India, it seems impossible not to conclude that the evidence of these monuments attests the existence in India for that long period of *a great iron manufacture*, well established, and with a relative cheapness and certainty of product that admitted of the use of iron as a material for public monuments and as a building material in sacred edifices, and that this manufacture was extinct, and the arts and methods lost, long before any more modern European occupation of India. So that, far from Indian iron-working having been the same feeble thing we see it to-day, from time immemorial it was once a great and flourishing craft, and extended over parts of the entire Indian peninsula.

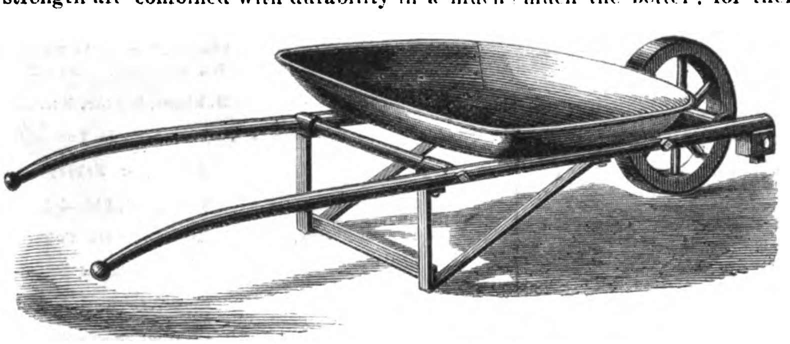
"Nothing heretofore brought to light in the history of metallurgy seems more striking to the reason as well as the imagination than this fact: that from the remote time when Hengist was ruling in Kent, and Cedric landing to plunder our barbarous ancestors in Sussex, down to that of our Third Henry, while all Europe was in the worst darkness and confusion of the Middle Ages—when the largest and best forging producible in Christendom was an axe or a sword-blade—these ancient peoples of India, the forerunners of those now so enfeebled and degraded, possessed a great iron manufacture, whose products Europe even half a century ago could not have equalled.

"Yet these conclusions rest on no *new* facts, but on the colligation of old ones by the light of practical knowledge. Indian archæologists and writers have long known of the existence of these iron monuments of an ancient and lost art in India, but their importance has, the writer believes, not before been recognized as bearing on ancient oriental metallurgy. The reason of this is that those who have examined the monuments of India, however scholarly and able in many ways, have not been metallurgists, and have had no practical knowledge of iron-working. The ancient and, indeed, the existing technology at large of India—still more of Asia at large—remains almost unexplored and undescribed, and whenever it shall be examined, analyzed, and described by really competent men—and such have never yet been commissioned with the task—results even more strange, and perhaps of more importance, historical and practical, than those deducible from the Delhi iron pillar, will no doubt come to light.

"Since the foregoing was in type, a notice has appeared in *Les Mondes* (tome xxvi., Dec. 1871), by M. Sévoz, an engineer of mines, resident in Japan, of the iron-working districts of that country, which may throw some light on the conjectural modes by which these great forgings may have been effected by human power in those remote ages in India. In reference to the mode of iron-working in the mining province of Ykouno, M. Sévoz says: 'The treatment employed is a sort of imperfect Catalan method. . . . . but what distinguishes the Japanese method from that of (Depart.) Ariége is that they treat at once 16,000 kilos. of ore, and produce an enormously long pig of 1,300 kilos., which is broken up under a huge hammer, constructed after the style of a pile-driving ram, to which motion is given by a walking wheel of 11·5 meters diameter, acted upon (montée) by men.' One can see that potent blows may thus be given, but their frequency and regularity do not seem such as thus to admit of a forging being produced, even if the means for heating a mass as huge as those referred to were capable of being guessed at."

Tuthill's Patent Wheelbarrow.

The invention herewith illustrated comprises a novel construction of wheelbarrow, with metallic tubular frame, whereby cheapness, lightness, and strength are combined with durability in a much



TUTHILL'S PATENT WHEELBARROW.

higher degree than in those with frames of wood. The frame is composed of the longitudinal tubular side-pieces formed with suitably shaped handles, and connected by tubular transverse or cross pieces. These latter are furnished at their ends with internally fitting thimbles, so formed as to fit snugly against the semi-cylindrical surface adjacent of the side-pieces. Metal rods, extending through the side-pieces of the thimble and through the cross-pieces from end to end, are tightened by nuts on their outer extremities to bind the parts of the frame together. The wheel and the metallic legs or standards and trough-shaped body of the barrow are of any usual or suitable construction, and need no particular description. This improvement in wheelbarrows is the subject of several patents dated within the past two or three years, and, to secure adequate protection to the patentee, more recently re-issued through the "American Artisan Patent Agency." These barrows have been extensively introduced on the Pacific Coast by the inventor, Mr. Beckwith W. Tuthill, formerly of Oregon City, Oregon, but now of New York City. They are manufactured by Messrs. Fletcher, Harrison & Co., Nos. 266 and 267 West Street, New York City.

Coir and Cane.

There are many ways in which capital and energy might be employed in Jamaica with safety and profit. Sugar estates pay well, beyond a doubt—although planters, like you prosperous farmers, usually complain of "bad times"—for they sustain the burden (which absentee proprietorship necessarily entails upon them) of attorneys' and overseers' salaries. But unless "Muscovado" has had ample experience in the management of a sugar estate in all its numerous and varied details, which no novice can undertake, I advise him to turn his attention to some other business, that of coffee-planting, for instance. Into this, I should think (I have no practical knowledge, but speak only from ordinary judgment) he might get a sufficient insight in a season or two to be able, at the end of that time, to launch out confidently and safely, in a small way at first, but increasing his cultivation yearly. There are plenty of coffee properties to be bought cheap with plant, barbecues, etc., at from £300 or less and upwards, which, with careful management, may be made to pay for themselves in a few years. Then, again, cattle-breeding, or as it is termed here pen-keeping, offers many inducements to capitalists with the requisite knowledge. There is always a steady demand for estates, working steers, and, as the Englishman's penchant for roast beef cleaves to him even in the West Indies, fat stock, too, are readily salable. A young man accustomed to farm labor, with £500 in his pocket, would never have reason to regret settling in Jamaica. If he had £1,000, so much the better; for then he could buy a snug little property of from 500 to 800 acres (a thrown-up sugar estate with good buildings), with several hundred cocoa-nut trees in full bearing, and would be able, too, to stock it moderately. Cocoa-nut trees are worth, on an average, at least a dollar per annum each (some will smile at this low estimate), to say nothing of the value of the fiber, which, teased from the husks by inexpensive machinery, would add almost another dollar to the annual value of the tree. These precious husks are allowed to rot, or are burned through ignorance or lack of enterprise. Land is now being taken up for cocoa-nut plantations for future manufactures of oil and fiber, and there is no safer investment under the sun. An American company is here crushing and bailing, and sending to their mills in New York every year, hundreds of tuns of bamboo for the manufacture of paper. And it is thought that, if pulping works were established in the island for supplying paper-stock to manufacturers at home, who seem at their wit's end for obtaining raw material, large fortunes would be made by the business.—*Cor. English Mechanic.*

British Trade with Brazil.—It is computed that there are now 71 steamers, of an aggregate burthen of 96,955 tuns, trading between Liverpool and London and Brazil. Before the close of 1872, it is estimated that the aggregate burthen of these steamers will be carried to 100,000 tuns.

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ISSUED FROM THE UNITED STATES PATENT OFFICE

For the Week ending January 9, 1872,

AND EACH BEARING THAT DATE.

[Reported officially for the "American Artisan."]

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122,510.—PAPER-BAG MACHINE.—Lorenzo D. Benner, Boston, Mass.
122,511.—BLACKBOARD RUBBER.—James F. Bigger and William A. Pugh, Rushville, Ind.
122,512.—SEALING THE NOZZLES OF OIL-CANS.—Jabez A. Bostwick, New York City.
122,513.—APPARATUS FOR AGING AND MIXING LIQUORS.—Samuel C. Bruce, New York City. Ante-dated Dec. 20, 1871.
122,514.—ROCK-DRILL.—Milan C. Bullock, New York City.
122,515.—COTTON CULTIVATOR.—Madison B. Camp, Riley Center, Kansas. Ante-dated Jan. 8, 1872.
122,516.—MANUFACTURE OF HINGES.—Lewis Crooke, New York City.
122,517.—LOCKED PLUG-COCK CONNECTION.—Jarvis B. Edson, Brooklyn, N. Y.
122,518.—CHAMBER COMMODE.—Thomas Elkins, Albany, N. Y.
122,519.—BOOT AND SHOE.—James B. Field, Boston, Mass.
122,520.—CHEESE-HOOP.—Milton B. Fraser, Rome, N. Y.
122,521.—STEAM-BOILER FURNACE.—Edgar F. Griffin, Chicago, Ill.
122,522.—MODE OF SLINGING KNAPSACKS.—William Hoffman, United States Army. Ante-dated Dec. 30, 1871.
122,523.—MACHINE FOR COILING SPRINGS.—Frederick W. Rhinelander, New York City, and Julius L. Hornig, Jersey City, N. J., assignors to Frederick W. Rhinelander, New York City.
122,524.—MANUFACTURE OF IRON.—James J. Johnston, Allegheny, assignor, by mesne-assignments, to himself and Alexander Postley, Pittsburg, Pa.
122,525.—SANDAL.—Robert Johnston, Huntsville, Ala. Ante-dated Dec. 22, 1871.
122,526.—ARTIFICIAL BONE-BLACK FOR FILTERING.—William H. Kelsey, Cleveland, Ohio.
122,527.—CLOTHES-WRINGER.—Edwin King, Dunk'rk, N. Y.
122,528.—BRICK-KILN.—Thales Lindsley, New York City.
122,529.—DREDGING MACHINE.—William H. Lotz, assignor to John Thorne Clarkson, Chicago, Ill.
122,530.—MECHANICAL MOVEMENT.—James H. McCamy, Wytheville, Va.
122,531.—MANUFACTURING POINTED TYPE.—Theodore Miner and Joseph G. Moody, New York City.
122,532.—COMPOSITION FOR DESTROYING VERMIN.—Peter Miller, Pittsburg, Pa.
122,533.—BUCKLE.—Thomas O. Potter and Joseph William Smith, Boston, Mass.
122,534.—DUMMY ENGINE.—Thomas C. Robinson, Mystic River, Conn.
122,535.—KNITTING MACHINE.—Job Rose, Nottingham, England, assignor of one-half his right to William F. Salmon, Lowell, Mass.
122,536.—PLEASURE VEHICLE.—Cyrus W. Saladee, St. Catharine's, Canada.
122,537.—TORSION-SPRING FOR VEHICLES.—Cyrus W. Saladee, St. Catharine's, Canada.
122,538.—CASTING CAR-WHEELS.—John K. Sax, Pittston, Pa.
122,539.—HYDRAULIC JACK.—Elias J. Shaw and George F. Eisenhardt, Philadelphia, Pa.
122,540.—ALARM FOR PORTABLE BOXES, ETC.—William Shepherd and Alfred T. Murden, Brooklyn, N. Y. Ante-dated Dec. 21, 1871.
122,541.—INSECT-DESTROYER.—Robert V. Shockey, Mount Pleasant, Iowa.
122,542.—BEE-HIVE.—Harrison Staggs, Topeka, Kan.
122,543.—ARTICLE OF FOOD OR PEARL WHEAT.—James E. Weaver, Havelock, Pa.
122,544.—EXHAUST-VALVE FOR STEAM AND AIR CYLINDERS.—George Westinghouse, Jun., Pittsburg, Pa.
122,545.—BUCKLE.—Henry S. Woodruff, Janesville, Wis.
122,546.—BABY-TENDER.—Charles N. Ziegler, Grafton, Ohio.
122,547.—FASTENING FOR FISH-PLATES.—Richard Anthony, Kingston, Pa.
122,548.—MANUFACTURE OF PAPER.—Stephen D. Baldwin, Marysville, Cal.
122,549.—FARE-BOX.—Henry Baranger, St. Louis, Mo.
122,550.—LIME-KILN.—Daniel T. Barrett, Port Byron, Ill.
122,551.—MACHINE FOR TENONING SPOKES AND BORING FELLIES.—Joseph Bauman, Shepherdstown, Pa.
122,552.—TOY.—John W. Beatty, Petroleum Center, Pa.
122,553.—APPLE PARER, CORER, AND SLICER COMBINED.—Geo. Bergner, Washington, Mo.
122,554.—IRONING-TABLE.—Peter Bostrom, Galesburg, Ill.
122,555.—SEWING-MACHINE.—Charles F. Bosworth, Milford, Conn.
122,556.—ROW-LOCK.—Atwater E. Brockett, New Haven, Conn.
122,557.—PIANO.—Stephen P. Brooks, Somerville, Mass.
122,558.—BOX FOR SEIDLITZ POWDERS.—Charles A. Browne and Isaac S. Browne, North Adams, Mass.
122,559.—HINGE.—John David Browne, Madisonville, Ohio.
122,560.—MICA LAMP-CHIMNEY.—George M. Ball, New Baltimore, N. Y.
122,561.—CORN-HARVESTER.—John Burke, Sycamore, Ill.
122,562.—CLAPBOARDING.—Franz Buscher, Dunkirk, N. Y.
122,563.—BALE-TIE.—John T. Butler, New Orleans, La.
122,564.—CAR-BRAKE.—Frederick A. Canfield, Dover, N. J.
122,565.—DUMPING-WAGON.—Walter W. Carré, New Orleans, La.
122,566.—STEAM-VALVE.—Rufus B. Chapman and E. Frank Spaulding, Cambridgeport, Mass.
122,567.—COMBINED SEEDER, PLOW, AND ROLLER.—Overton B. Cheatham, Henderson, Ky.
122,568.—CLOVER-HULLER AND CLEANER.—Thomas Church, Lewisburg, Pa.
122,569.—EMBOSSING.—Robert J. Chute, Philadelphia, Pa.
122,570.—PISTON-PACKING.—John J. Clause, assignor of two-thirds of his right to Ezra Nicholson and Charles B. Stilwell, Cleveland, Ohio.
122,571.—COVER FOR WATCH-FRAMES.—Abel Combs, Burlingame, Kan.
122,572.—ELECTRO-MAGNETIC ENGINE.—Henry S. Daggett, Lafayette, Ind.
122,573.—RIFLE FOR SHARPENING HARVESTER-CUTTERS.—William H. Daniels, Bryan, Ohio.
122,574.—MANUFACTURE OF FLUID MEAT.—Stephen Darby, London, England.
122,575.—Not issued.
122,576.—ICE-PITCHER.—James Dawson, assignor to himself and Henry A. Tweed, New York City.
122,577.—COMPOUND IMPLEMENT.—Benjamin G. Devoe, Timothy Rogers, and John C. Beals, Fredericktown, Ohio.
122,578.—METALLIC PACKING FOR PISTON-RODS, ETC.—David Devore, Philadelphia, Pa., assignor to himself and Frederick A. Churchman, Wilmington, Del.
122,579.—FASTENING FOR BOTTLE-STOPPERS.—Hiram T. Dewey, Brooklyn, N. Y.
122,580.—WEATHER-STRIP.—Joseph M. Dils, Osceola, Ind.
122,581.—MACHINE FOR THE MANUFACTURE OF WOOD-PULP.—Hezekiah Dodge, Albany, N. Y., assignor to New York Wood-pulp Company, New York City. Ante-dated Dec. 28, 1871.
122,582.—PLOW.—John Dodge, assignor to himself and James Farrer, Adrian, Mich.
122,583.—TANK-VALVE.—John H. Dorst, New Albany, Ind.
122,584.—CHROMATIC KEY-BOARD.—Harrison Downes, New York City.
122,585.—CRUCIBLE FOR MELTING IRON, STEEL, ETC.—William F. Dunbarr, assignor to himself and Samuel M. Kier, Pittsburg, Pa.
122,586.—CAR-COUPLING.—Churchill Eastin, Louisville, Ky.
122,587.—BOOT-CLAMP FOR BASE-BALL PLAYERS.—Edward S. Ellis, Trenton, N. J.
122,588.—WATER-WHEEL.—William H. Elmer, Dayton, Wis. Ante-dated Jan. 6, 1872.
122,589.—COAL-SCREEN.—Thomas Farron, Lincoln Township, Pa.
122,590.—ARTIFICIAL FUEL.—Moses Alexander Febrey and Thornton Smith, Washington, D. C.
122,591.—CONCRETE PAVEMENT.—Samuel Filbert, Philadelphia, Pa.
122,592.—APPARATUS FOR COOLING BEER.—Andre Foubert, Buffalo, N. Y.
122,593.—BOILER FOR TOY STEAM-ENGINES.—Russel Frisbie, Cromwell, Conn.
122,594.—SELF-LOCKING BLIND-HINGE.—Oliver S. Garretson, Buffalo, N. Y.
122,595.—DEVICE FOR MOVING BLIND-SLATS.—Louis Gathmann, Chicago, Ill.
122,596.—WASHING MACHINE.—D. W. George, Pulaski, Iowa.
122,597.—KNIFE-SHARPENER.—Samuel Gissinger, Pittsburg, Pa. Ante-dated Dec. 23, 1871.
122,598.—BEE-HIVE.—James W. Gladding, Normal, Ill.
122,599.—PLANING MACHINE.—James S. Graham, Rochester, N. Y.
122,600.—SPARK-ARRESTER.—William F. Grassler, Muncy, Pa.
122,601.—SMOKE AND CINDER-CAR FOR RAILROADS.—Stanley Greacen, New York City. Ante-dated Dec. 26, 1871.
122,602.—LOZENGE MACHINE.—Edward Günther, New York City.
122,603.—PRUNING-SHEARS.—Reuben Hall, Clyde, Ohio.
122,604.—ANNEALING FURNACE.—Thorvald F. Hammer, assignor to himself and E. C. Hammer, Branford, Conn.
122,605.—GRIST MILL.—Edward Harrison, New Haven, Conn.
122,606.—STEAM-BOILER, HEATER, AND CONDENSER TUBE-JOINTS.—Joseph Harrison, Jun., Philadelphia, Pa.
122,607.—FLUTING MACHINE.—Jacob F. Hayen, Buffalo, N. Y.
122,608.—PILE REMEDY, ETC.—Leopold Heins, New York City.
122,609.—CARPENTER'S PLANE.—Henry A. Holt, Wilton, N. H.
122,610.—CAR-COUPLING.—Thomas G. Hughes, Adrain Nutting, and Lorenzo Aldrich, Horton, Iowa.
122,611.—RUFFLING ATTACHMENT FOR SEWING-MACHINES.—Allen Johnston, Ottumwa, Iowa.
122,612.—SCREENING APPARATUS.—David Kahnweiler, New York City.
122,613.—TUCK-MARKING ATTACHMENT FOR SEWING MACHINES.—Amasa C. Kasson, Milwaukee, Wis.
122,614.—PIPE-COUPLING.—William Kearney, Bergen County, N. J.
122,615.—FIRE-PROOF SHUTTER.—George H. Knight, Cincinnati, Ohio.
122,616.—MILK-COOLER.—Cornelius H. Latham, Randolph, N. Y.
122,617.—FOUNTAIN AND COOLER COMBINED.—Charles Lauby, Brodhead, Wis.
122,618.—SPRING BED-BOTTOM.—Sylvester Logan, Greenville, Pa.
122,619.—COWL FOR CHIMNEYS AND RAILROAD-CARS.—Stimmel Lutz, Philadelphia, Pa.
122,620.—PROJECTILE FOR SMALL ARMS.—Carlos Madnell, New Orleans, La.
122,621.—MEDICAL COMPOUND OR SALVE.—Louisa Masters, Jackson, Miss.
122,622.—COMPARTMENT CAR FOR RAILWAYS.—William D. Mann, Mobile, Ala.
122,623.—COMPOSITION FOR LINING WATER-COOLERS.—Adolph Mahler, New York City.
122,624.—PROPULSION OF VESSELS.—Elisha Matteson, assignor of one-half his right to Amasa C. Hall, Norwich, Conn.
122,625.—GAS APPARATUS.—Hiram S. Maxim, assignor to Myron H. Strong, Brooklyn, N. Y.
122,626.—TUCK-MARKER FOR SEWING-MACHINES.—George McFadden, Worcester, Mass.
122,627.—GRADING AND DITCHING SCRAPER.—Charles D. Meigs and Montgomery C. Meigs, Romney, Ind.
122,628.—SHUTTER-FASTENER.—Nelson V. Merrill, Goffstown, N. H.
122,629.—EYE-GLASS SUSPENDER.—Samuel F. Merritt, Springfield, Mass.
122,630.—HARVESTER.—Quintus F. Messinger, assignor to himself, S. S. Messinger, and G. F. Messinger, Easton, Pa.
122,631.—STOVE-PLATFORM.—Irene Miller, Cortlandville, N. Y.
122,632.—BOOT AND SHOE.—John A. E. Moroney, Pontiac, Mich.
122,633.—PRUNING-KNIFE.—David Morris, Bartlett, Ohio. Ante-dated Jan. 1, 1872
122,634.—RAILWAY-FROG.—William Morris, Harrison, N. J.
122,635.—AXLE-BOX FOR CARRIAGES.—Francis B. Morse, assignor to himself and H. D. Smith & Co., Plantsville, Conn.
122,636.—STAMPING VARNISHED SURFACES.—Teile H. Müller, Yonkers, N. Y., assignor to Joseph Reckendorfer, New York City.
122,637.—VAPOR-BURNER.—Samuel G. Munn, Chicago, Ill., assignor to James Munn, West Fork, La.
122,638.—PIPE-WRENCH.—Charles Neames, New Orleans, La.
122,639.—EARTH-SCRAPER.—Madison Newton, Kentland, Ind.
122,640.—PROPULSION OF VESSELS.—Hiram Niles, Chicago, Ill.
122,641.—ROTARY ENGINE.—Arthur O'Leary, Iowa City, Iowa.
122,642.—BRICK MACHINE.—John Ormerod, assignor to Peekskill Manufacturing Company, Peekskill, N. Y.
122,643.—SOIL-PULVERIZER.—David Osborn, Paoli, Ind.
122,644.—CHAIN-COUPLING.—Milo Osborn, Cleveland, Ohio.
122,645.—SPRING BED-BOTTOM.—Benjamin H. Otis, assignor to himself, M. D. Rhame, and Thomas Covington, Havana, Ill.
122,646.—CARRIAGE-WHEEL.—Charles Palmer, Hamilton, Nev.
122,647.—POWER-HAMMER.—Joseph Palmer, Concord, N. H.
122,648.—DEVICE FOR UTILIZING POWER AT RAILWAY STATIONS.—William J. Plecker, Bushnell, Ill.
122,649.—MACHINE FOR THE MANUFACTURE OF RUBBER HOSE.—James Quin, Leyland, near Preston, Kingdom of Great Britain and Ireland.
122,650.—PROPULSION OF VESSELS.—Thomas B. Raymond, Winona, Mich.
122,651.—FURNACE FOR THE MANUFACTURE OF IRON.—Abram Reese, assignor of one-half his right to Hugh McDonald and Richard Perry, Pittsburg, Pa.
122,652.—BIT-BRACE.—James Rice, Prairie Creek, Ind.
122,653.—STRAND-TWISTING MACHINE FOR ROPE-WALKS.—John Rinek, Easton, Pa.
122,654.—TORPEDO FOR OIL-WELLS.—Edward A. L. Roberts, Titusville, Pa.
122,655.—DEFLECTOR FOR RAILROAD-CARS.—John A. Rockwood, Normal, Ill.
122,656.—TELEGRAPH-POLE.—Timothy Rogers, Fredericktown, Ohio.
122,657.—DEVICE FOR RAISING TAILINGS FROM MINES.—Wilford A. Rogers, Folsom, Cal.
122,658.—WRINGING MACHINE.—John G. Roth, New York City, assignor to the Metropolitan Washing Machine Company, Middlefield, Conn.
122,659.—WRINGING MACHINE.—John G. Roth, New York City, assignor to the Metropolitan Washing Machine Company, Middlefield, Conn.
122,660.—HOSE-JUMPER FOR STREET-RAILWAYS.—Joseph Rue, Philadelphia, Pa.
122,661.—CAR-WHEEL.—John C. Rupp and Stephen Ott, Newark, Del. Ante-dated Dec. 23, 1871.
122,662.—JOURNAL-BOX FOR LUBRICATING AXLES.—Jacob Schinneller, Temperanceville, Pa.
122,663.—PLAITED TRIMMING.—Augustus Schultz, Hoboken, N. J.
122,664.—ELECTRO-MAGNETIC HOTEL-ANNUNCIATOR.—George B. Scott, Brooklyn, N. Y.
122,665.—ILLUMINATED BADGE FOR HATS.—William J. Scott, Albany, N. Y.
122,666.—PADLOCK.—August Seeger, New York City.
122,667.—ELEVATED RAILWAY.—James E. Serrell, New York City.
122,668.—MACHINE FOR TAPPING GAS AND WATER MAINS.—George Shelley, Easton, Pa.
122,669.—THILL-COUPLING.—Edwin F. Shoenberger, Shoemakertown, Pa.
122,670.—METALLIC ROOFING.—John Siddons, Rochester, N. Y.
122,671.—METALLIC ROOFING.—John Siddons, Rochester, N. Y.
122,672.—MEDICAL COMPOUND OR LIVER INVIGORATOR.—William L. Simmons, Weatherford, Tex.
122,673.—SEWING-MACHINE.—David M. Smyth, Orange, N. J. assignor to Stickler, Elliot & Wilson, New York City.
122,674.—MACHINE FOR CHAMFERING THE RAILS OF WAGON-BODIES.—Charles Spofford, Boston, Mass. Ante-dated Dec. 28, 1871.
122,675.—WALKING-PLANTER.—Mills W. Stephenson, Pickensville, Ala.
122,676.—LOCK-NUT.—Hiram C. Stouffer, assignor to himself, Arthur C. Yengling, and Jacob Deemer, Columbiana, Ohio.
122,677.—RATCHET-DRILL.—John J. Switzer, Williamsburg N. Y.
122,678.—COMBING MACHINE.—Edouard Tavernier, Lille, France, assignor of one-half his right to Augustus Morand, Brooklyn, N. Y.
122,679.—SHEET-STEEL BELL.—John E. Tencate, Pittsburg, Pa.
122,680.—IRONING MACHINE.—Charles C. Thomas, Natchez, Miss.
122,681.—CLEANING WATCHES AND CLOCKS.—William W Thompson, Smithville, Ga.
122,682.—CONSTRUCTION OF RAILWAYS.—Theodore R. Timby Tarrytown, N. Y.

122,683.—WATER-METER.—Theodore R. Timby, Tarrytown, N. Y.

122,684.—HOT-AIR FURNACE.—Lorenzo B. Tupper, New York City.

122,685.—COMBINED BAG-HOLDER AND TRUCK.—Philip C. Van Brocklin, Paris, Canada.

122,686.—TRUCK.—Anthony Van Haagen and John H. Cooper, assignors to Anthony Van Haagen, Philadelphia, Pa.

122,687.—TELEGRAPH PRINTING APPARATUS.—Henry Van Hoevenbergh, New York City.

122,688.—SAFETY-CONDUCTOR FOR POWDER-KEGS.—Matthew Ward, Mount Carmel, Pa.

122,689.—SASH-HOLDER.—George W. Warren, Bristol, Ind.

122,690.—CAR-COUPLING.—Gustav C. E. Weber, Cleveland, Ohio.

122,691.—SMUT MILL.—John Wernwag, assignor to himself William B. Wernwag, Harper's Ferry, West Va., and Joseph P. Shannon, Baltimore, Md.

122,692.—CAVIL.—John A. Wood, Pittsburg, Pa.

RE-ISSUES.

4,703.—CORN-POPPER.—William F. Collier, assignor to Howe, Bigelow & Co., Worcester, Mass. Patent No. 111,319, dated Jan. 31, 1871.

4,704.—ELECTRO-MAGNETIC SAFE-PROTECTOR.—William Duncan, assignor, by mesne-assignments, to himself, C. C. Rowell, and Aaron H. Cragin, Lebanon, N. H. Patent No. 117,-713, dated Aug. 1, 1871.

4,705.—BASE-BURNING STOVE.—John R. Hawkins, assignor to Backus, Button & Co., Syracuse, N. Y. Patent No. 44,307, dated Sept. 20, 1864.

4,706.—FLANGED COLLAR FOR BROOMS.—Henry Alpheus Lee, New York City, assignor of one-half his right to John F. Lee, Jun., Brooklyn, N. Y. Patent No. 119,775, dated Oct. 10, 1871.

4,707.—GAS-PURIFIER.—Peter Munzinger, assignor to Morris, Tasker & Co., Philadelphia, Pa. Patent No. 88,326, dated March 30, 1869.

4,708.—PLATFORM BRIDGE FOR RAILWAY-CARS.—Amos Rank, Salem, Ohio. Patent No. 77,321, dated April 28, 1868.

4,709.—SADDLE-TREE.—Samuel E. Tompkins, Sing Sing, N. Y. Patent No. 30,168, dated Sept. 25, 1860.

DESIGNS.

5,462.—CARPET-PATTERN.—John H. Bromley, assignor to John Bromley & Sons, Philadelphia, Pa.

5,463.—CAR-SEAT END FRAME.—Thomas W. Brown, Belmont, Mass.

5,464.—DRAWER-PULL.—Albert D. Judd, New Haven, Conn.

5,465.—TRELLIS.—Joseph G. Konvalinka, Astoria, N. Y.

5,466.—RIMS OF VASES, ETC.—Jonathan Moore, assignor to himself and Abram Horton, Brooklyn, N. Y.

5,467.—FLOOR OIL-CLOTH PATTERN.—Joseph Robley, assignor to William M. Brasher & Co., Brooklyn, N. Y.

5,468.—CARPET-PATTERN.—John Howie Smith, Enfield, assignor to Hartford Carpet Company, Hartford, Conn.

5,469.—CIRCULAR REGISTER.—Edward A. Tuttle, New York City.

5,470 and 5,471.—HOT-AIR AND VENTILATING REGISTER.—Edward A. Tuttle, New York City.

TRADE-MARKS.

626.—WHISKY.—Barkhouse, Brothers & Co., Louisville, Ky.

627.—PLOWS.—Bouton, Whitehead & Co., Naperville, Ill.

628.—LAMP-CHIMNEYS.—Charles F. A. Hinrichs, New York City.

629.—DISINFECTANTS, ETC.—Marcelin, Warren & Co., New York City and Brooklyn, N. Y.

630.—AQUEOUS SOLUTION OF BALSAMIC GUMS.—Oscar Oldberg, Washington, D. C.

631.—SEWING MACHINE.—The Finkle & Lyon Manufacturing Company, Middletown, Conn.

EXTENSIONS.

18,966.—LOCOMOTIVE ENGINE-WHEEL.—George S. Griggs.—Dec. 29, 1857.

18,874.—BAGASSE FURNACE.—Moses Thompson.—Dec. 15, 1857.

DURING the past summer Prof. Tyndall made the following experiment on a rectangular bar of ice cut out from the Morteratsch glacier. This bar was supported at the ends and weighted at its center, while the temperature was several degrees below the freezing-point. After the lapse of ten or twelve hours a perceptible curvature was noticeable; thus showing that ice is flexible.

CHANGING the Maine Central Road to a narrow gauge between Waterville and Danville Junction necessitated the drawing and driving of 588,000 spikes.

THERE are eight pin factories in the United States, whose annual production is 2,000,000 packs, each pack containing 3,660 pins; total, 6,720,000,000 pins.

THE National Labor Union, at a meeting in San Francisco Dec. 26, organized a movement in favor of Mr. George W. Julian, of Indiana, for President.

APPLICATIONS FOR EXTENSION.

OPPONENTS of extensions must file *written* objections in the Patent Office at least 20 days before the day-of-hearing; and on the Patent Office, and state the reasons of their opposition. All testimony—*pro* or *con*—must be taken and transmitted in accordance with the official rules, which will be furnished on application. The under-named patentees have recently petitioned for extensions (for seven years) of patents granted to them in the year 1858:—

JOHN L. MASON, New Brunswick, N. J.—*Lathe Chuck*.—Patented March 30, 1858; testimony will close on Feb. 27, next; last day for filing arguments and examiner's report, March 8; day-of-hearing, March 13.

PERRY G. GARDINER, New York City.—*Machine for testing and measuring the Strength of Car-springs*.—Patented March 30, 1858; testimony will close on Feb. 27, next; last day for filing arguments and the examiner's report, March 8; day-of-hearing, March 13.

LUDWIG GREINER, Philadelphia, Pa.—*Constructing Dolls' Heads*.—Patented March 30, 1858; testimony will close on Feb. 27, next; last day for filing arguments and examiner's report, March 8; day-of-hearing, March 13.

ERNEST KAUFMAN, Philadelphia, Pa.—*Ice Pitcher*.—Patented April 6, 1858; testimony will close on March 5, next; last day for filing arguments and examiner's report, March 15; day-of-hearing, March 20.

WILLIAM F. DAILY, Baltimore, Md.—*Truss Pad*.—Patented April 6, 1858; testimony will close on March 12, next; last day for filing arguments and examiner's report, March 22; day-of-hearing, March 27.

WILLIAM A. CLARK, Westville, Conn.—*Method of Seating the Movable Cutters in Expansive Bits*.—Patented May 11, 1858; re-issued June 22, 1869; testimony will close on April 9, next; last day for filing arguments and examiner's report, April 19; day-of-hearing, April 24.

SILAS P. KNIGHT, Brooklyn, N. Y.—*Production of Electrotype Plates*.—Patented May 25, 1858; testimony will close on April 28, next; last day for filing arguments and examiner's report, May 3; day-of-hearing, May 8.

ENGLISH PATENT JOURNAL.

LIST OF APPLICATIONS FOR PATENTS

ON WHICH

Provisional Protections

HAVE BEEN OBTAINED IN ENGLAND, BY OR FOR AMERICAN INVENTORS.

[*This list is condensed weekly from the "Journal of the British Commissioners of Patents," expressly for the* "AMERICAN ARTISAN."]

2,105.—IMPROVEMENTS IN DRESSING AND CLEANSING MILL-STONES, AND IN MATERIALS EMPLOYED THEREIN.—John W. Fry, Nashville, Tenn.—Aug. 10, 1871.

3,302.—IMPROVEMENTS IN WATERPROOF CLOTH.—Bernhard Metz, New York City.—Dec. 7, 1871.

3,392.—IMPROVED ROTARY STEAM-ENGINE.—Michael Schwartz, Bangor, Maine.—Dec. 6, 1871.

3,322.—CENTRIFUGAL DRAINING MACHINE FOR DRYING SUGAR AND OTHER SUBSTANCES.—Hugh Walbridge Lafferty and Robert Lafferty, Gloucester, N. J.—Dec. 8, 1871.

3,323.—SEWING-MACHINE FOR UNITING THE SOLES AND UPPERS OF BOOTS AND SHOES.—Lyman Reed Blake, Fort Wayne, Ind.—Dec. 8, 1871.

3,318.—IMPROVEMENTS IN THE TABLES AND OPERATING MECHANISM OF SEWING-MACHINES.—Simon Willard Wardwell, Jun., St. Louis, Mo.—Dec. 11, 1871.

Fort Garry Gold.

ACCORDING to the New York *World* news has been brought from Fort Garry that intense excitement prevailed at Winnipeg over recent gold discoveries at Lake Shabondawan. Many specimens of gold-dust, nuggets, and gold-bearing quartz had been brought to Fort Garry, and so confident were the people in general that a new Eldorado of unsurpassed richness had been discovered, that hundreds at once repaired to the scene of the discoveries, and the latest information from that region has not only confirmed the previous reports, but even exaggerated them to the extent of placing them among the richest mineral deposits in the world, outranking even California or Australia.

IT is said that the Government of Japan is considering the policy of sending twenty-one young ladies, the daughters of Daimios, to America to be educated.

M. S. R., OF N. Y.—The combination of wood charcoal and peat charcoal is not a new idea. It was in use years ago in Bohemia, Austria, for iron making. We do not think your project a very promising one, but commend the energy with which you propose to test the matter for yourself.

PHOTOGRAPHER, OF VT.—You can make a gold toning bath as follows:—Chloride of gold, three grains; acetate of soda, one drachm; water, twenty ounces. This should be prepared twenty-four hours before it is used. Another formula is:—chloride of gold, three grains; chloride of lime, two grains; water, twenty ounces. This will give you very dark tones, but must be prepared several days in advance.

G. G., OF KY.—In preparing scutched hemp for cordage, it need only be drawn through a coarse heckle; but if for fine yarn through heckles of varying degrees of fineness. In growing hemp, be careful to sow seed of the previous year's crop. The germination of old hemp seed is uncertain.

E. L., OF N. H.—When steam has commenced to blow off, it will not stop doing so when the pressure has fallen to that for which the valve is adjusted, but at several pounds less. This is because the bevel of the valve, when the latter is lifted, exposes a greater valve surface to the action of the steam than when the valve is down on its seat.

B. F., OF N. Y.—Experiments have shown that a pressure or power of more than twenty-five tuns is required to force a shear or cutter through a piece of scrap iron one square inch in cross section.

W. W., OF N. Y.—Water is the proper fluid with which to wet India ink for drawing.

STUDENT, OF OHIO.—The test for ammonia is turmeric paper. This, if brought in contact with ammonia, will turn from its proper yellow color to a deep red or brown.

F. W., OF PA.—The iron oxyd used in some gas-works instead of lime is revivified for repeated use by exposure to the atmosphere. A small percentage of lime is mixed with the oxyd before being placed on the purifiers, in order to take up any carbonic acid that may occur in the product.

R. L., OF N. J.—We know of no better way of clearing the external heating surface of your sectional boiler than that of throwing a jet of high pressure steam against it.

H. J., OF N. Y.—To make good glue, get a first-rate article in the first place. Steep it in cold water for twenty-four hours to soften it. If it swells without dissolving, it is good. Put half a pound of the glue (as weighed dry) in a quart of water contained in a suitable pan. Put the pan in a water-bath, and thus melt the glue slowly without danger of burning.

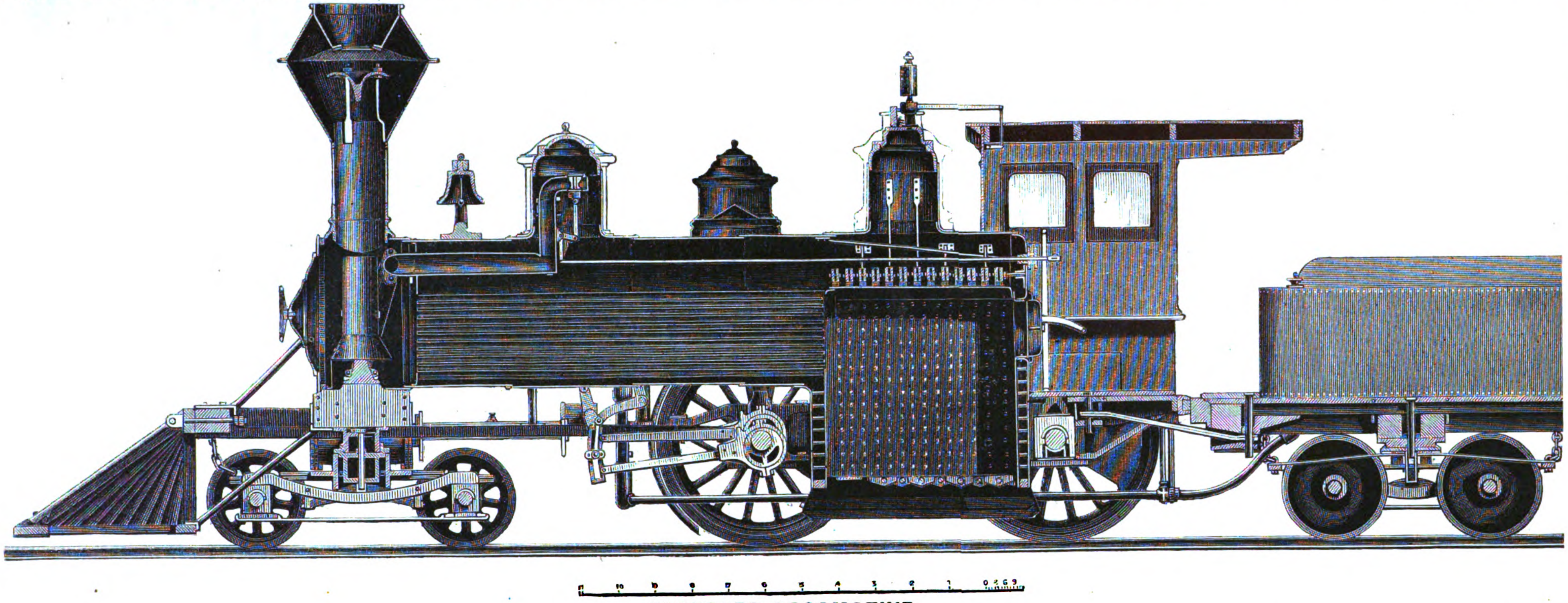
I. K., OF UTAH.—The Parke process of separating silver from lead consisted in fusing the alloy in an iron pot, and then adding melted zinc well stirred into the alloy. The fire being withdrawn as soon as this is done, the whole is left at rest for a time. The zinc combines with the silver to form an independent alloy, which rises to the top and is skimmed off. The zinc is distilled off, and the crude silver remaining is purified by cupellation.

D. B., OF PA.—We cannot say positively where the largest Bessemer converters are now located. A few years since those in Barrow-in-Furness, England, were the largest. Four in one group were each nine and one-half feet in diameter, and fourteen and three-fourths feet high, and held seven and one-half tuns of metal each. Another group is made up of converters holding six tuns each. Of course only a small part of the internal space of a converter is actually taken up by the charge, a large amount of room being required above the charge to prevent its ejection when the metal is agitated at the highest point to which its head is carried.

A. M., OF MD.—In the dry method of preparing chalk for hydraulic cement, you will have to subject the material to a heat of 212° or thereabouts, otherwise it will be difficult to powder and sift.

G. L. D., OF R. I.—Your idea of making a scarifier to destroy couch-grass and other foul vegetation from arable land, in such manner that instead of dragging the vegetation out in pieces, as has been commonly attempted, it will cut it closely below the surface. All plants will die if persistently cut down, whereas the simple tearing up frequently causes the roots to throw out new shoots, that grow more thriftily than ever. Your machine, however, would have to be passed over the ground several times in the course of the season, and for one year, at least, the field would have to lie fallow.

OTTOMAN TRAMWAYS.—The Stamboul tramways have been opened to the public. Carriages run every ten minutes from the bridge to Ak-Serai, beyond the Seraskeriate, and *vice versa*.



STANDARD LOCOMOTIVE.

Continued from page 33.

plied by one No. 5 injector and two pumps, with valves and cages of best hard metal accurately fitted. Plunger of iron. Cock in feed-pipe regulated from foot-board. The engine truck is constructed with frame, square wrought-iron, with center bearing and swing bolsters. Wheels of approved pattern, 28 inches diameter. Axles of best hammered iron, with inside journals 4½ inches diameter and 7½ inches long. Springs of cast-steel, connected by equalizing beams. The cab is of good pattern, substantially built of hard wood, well finished and fitted to place, and the pilot is of wood. As concerns furniture, the engine is to be furnished with sand-box, alarm and signal bells, whistle, two safety-valves, steam and water gauges, heater and gauge cocks, oil-cans, etc., etc. Also, a complete set of tools, consisting of two jack-screws, pinch-bar, monkey, packing and flat wrenches, hammer, chisels, etc. Cylinders lagged with wood and neatly cased with brass. Heads of cast-iron, polished. Steam-chests with cast-iron tops; bodies cased with brass. Domes lagged with wood, with brass casing on bodies and cast-iron top and bottom rings. Boiler lagged with wood and neatly jacketed with Russia iron secured by brass bands polished. All principal parts of engine accurately fitted to gauges and thoroughly interchangeable. All movable bolts and nuts and all wearing surfaces made of steel or iron case-hardened. All wearing brasses made of ingot copper and tin, alloyed in the proportion of seven parts of the former to one of the latter. The tender is on eight wheels, 30 inches diameter; axles of best hammered iron; outside journals 3¼ inches diameter and 6 inches long; oil light boxes with brass bearings. Springs of cast-steel equalized. Tanks well put together, with angle-iron corners and strongly braced. Top and bottom plates of No. 6 iron; side plates No. 8 iron. Capacity, 2,000 gallons."

Egyptian Railway Management.

ACCORDING to M. Delorme, a French writer, the management of railways in the land of the Pharaohs is rather at loose ends. Among other things, he states that, as concerns locomotive and rolling-stock mismanagement, it is difficult to point out the disorder and indifference that exist; the ideas that appear paramount are to permit engines to run at their own pleasure, to burn as much fuel, and to destroy as much stock as possible. Engines ready to start, sometimes are kept standing for twenty-four hours under steam, waiting for the trains they are to draw to be made up. The signal-men have the crudest notion of their duties, and one sees, on the arrival of trains after dark, white, red, and green lights flashed with embarrassing profusion, due to the doubts of the employee, who, uncertain which should be displayed, shows all. The trains travel with a regular irregularity, and the hours of arrival and departure are as uncertain as the speed achieved. The lighting of the carriages and the lubrication of the axle-boxes are miserably imperfect, owing—whispers rumors—to the artificial taste for oil acquired by the railway servants. Trains of empty wagons circulate purposelessly, and no care is taken in loading merchandise, so that while one wagon is loaded far beyond its capacity, its neighbor, which ought to have carried part of the weight, does nothing. It is asserted that there was once a time when an arrangement was entered into between some of the employees to have the passenger's tickets printed in England on their own special account. Of course, after a time, this proceeding was discovered and stopped; probably on no other railway system in the world would this corruption have been possible. The number of locomotives owned by the Egyptian railways is 240, a larger quantity than is required, judging from the fact that only 100 engine-drivers are employed.

Railroad Accidents.

FROM a record compiled from the newspapers, it appears that during the year ending Oct. 31, 1871, there were in the United States one hundred and seven railroad accidents, causing the death of one hundred and seventy persons and the serious injury of two hundred and fifty-four. These casualties occurred through collisions, the explosions of locomotives, the giving way of bridges, and the running of trains off the track. By collisions alone there were forty accidents, causing the death of one hundred and eight persons, and the serious injury of two hundred and eleven. By five of the principal railroad accidents eighty-one persons were killed, and one hundred and forty-eight were wounded.—*Exchange.*

THE Taunton (Mass.) Foundry Company has made a pulley twenty-seven feet in diameter, ninety inches on the face, and weighing over forty tuns.

AMERICAN ARTISAN

BROWN, COOMBS & CO., Publishers.
ISSUED WEEKLY AT
No 189 Broadway, New York.
S. T. BROWN. J. W. COOMBS.

AGENTS.
AMERICAN NEWS COMPANY.................New York City.
NEW YORK NEWS COMPANY................ do
NEW ENGLAND NEWS COMPANY..................Boston.
A. WINCH & Co...............................Philadelphia.
H. TAYLOR & Co...............................Baltimore.

WEDNESDAY, JANUARY 17, 1872.

BUILDING STONE.

THE production of artificial stone is a subject done to death in print, but hardly yet developed to actual existence as an established branch of industry. Enough has been accomplished to show that the material, manufactured according to any one of half a dozen different methods, in point of beauty and of resistance to crushing is equal to brick or ordinary building stone. The question of durability can, of course, be definitely settled only by trials through a long series of years, but in the meantime the known composition, in many cases, makes the probability of endurance under atmospheric influences at least equal to that looked for in common stone from newly opened quarries. But people are patient concerning the defects of what they are familiar with, but chary of content with whatever is comparatively untried. There would be objurgation deep and lasting of any artificial stone that, after a few years' test, showed the disintegrating surface of some of the finest brownstone dwellings in New York and other cities.

The fabrication of a desirable building material is based essentially on the use of a strong and weather-proof cement, it being of very little consequence whether the bulk of crude material used be sand or larger fragments of mineral. For this purpose many substances have been employed with more or less success, the best results having been commonly obtained when, as in the Ransome and some other processes, the cement has been formed by a change wrought by the impregnation of the molded stone with a suitable chemical in solution. It appears, however, that this is not absolutely necessary to the production of a good and durable building stone. It is stated that in Calcutta a limited use, for steps to buildings, etc., has been made of Portland cement mingled with a small percentage of green vitriol or copperas, and this with very satisfactory results, as relates to wear and resistance to abrasion. The sulphate doubtless gives up its sulphuric acid to form a sulphate of lime or plaster-of-Paris, remaining itself a simple oxyd of iron, intimately distributed throughout the mass; the sulphate of lime and iron oxyd, being both strong cements, adding to the tenacity of the Portland.

Aside from the cementing substance, sand is the material to which recourse is had for the production of stone by artificial means. But in some instances at least resort may be had to something better. In marble quarrying, at least one-third of the product is waste, and is not only worthless, but is a constant source of annoyance, from the impossibility of getting it out of the way. At the West Rutland, Vt., quarries, this waste is piled over the adjoining fields to a depth of from thirty to seventy feet. It may be justly queried whether under such conditions a new building stone, approximating in some degree to marble in strength and appearance, could not be cheaply made. Burned marble refuse would furnish lime, which, mingled with due percentage of alumina, according to well-known and thoroughly tested formulas, would furnish a strong, though factitious, Portland cement, capable in its turn of cementing the broken rubbish of the quarries into symmetrical masses for the use of the architect.

A NEEDED IMPROVEMENT IN HOP-PRESSES.

THE hop crop is, in some localities, the staple one, and, considering its value, it is a matter of surprise that the processes and operations involved in fitting it for market have not reached a stage of greater improvement. This remark applies especially to that of pressing or baling. There has, to be sure, in this respect considerable progress been made during the past ten or a dozen years, in the construction and very general introduction of portable baling presses conveniently operated by manual effort, and comparatively low in price. But the baling operation is yet, as it has always been, one of the most disagreeable of all work incident to agriculture, and one which ought by this time to be ameliorated by mechanical aids.

The dried hops are commonly swept from the "carpet" of the kiln to an adjoining storage room on the second floor of the building. In pressing, they are fed as needed through an opening in the floor to a bottomless sack of gunny-cloth, by which they pass down into the previously arranged curb of the press below. To compact the loose, dry material in curb with sufficient density to enable the required weight to be brought within the capacity of the press before running down the follower, it is customary for two men to station themselves within the narrow limits of the curb and tread the material with their feet until the curb, is filled. As the lupulin flies like the thickest dust, and has a most pertinacious stickiness, its action on eyes, nostrils, face, and hair may be readily imagined, to say nothing of the soilure of clothing and other disagreeable attending circumstances. So far as we know, no mechanism—other than a rude pounder like that used for pounding clothes in washing, and wholly inefficient for the purpose under consideration—has ever been suggested to do away with the need of the repugnant labor just previously sketched. Such a substitute for human feet may be difficult to construct, but not more so than many other devices that have taken a permanent place among the mechanical helps to agriculture, and if it can be devised it ought to be.

CONCERNING CIDER.

THE best cider in the world is said to be made in the Province of Normandy in France, where it was introduced many ages since by the Moors, who preserved among them the art of making the beverage after coming from the place of their nativity. The Norman cider mills, so say the books, are composed of "revolving edge stones, turned in a circular stone cistern by one or two horses"—in other words, by a rude Chilian mill, which, in one form or another, still holds its own against the most ingenious grinding and comminuting machinery produced by the inventive genius of the nineteenth century. It grinds the hardest ores and tempers the softest clay; it is used by preference in the San Francisco Mint for pulverizing the dross from the melting-pots in order that the last remnant of gold may be extracted and saved. From its simple construction and direct action but little power is lost from friction, and an iron mill of this character, as far as crushing the fruit is concerned, would doubtless do more and better work than the more common apple-grinding apparatus. There would remain, however, the liability to rust, and the need of simple but efficient means for continuously feeding the fruit and removing the pulp. The former could be remedied by nickel-plating the grinding surface of the wheel and basin of the trough, and painting the rest. The method is a matter for future improvements to provide.

For the expulsion of the juice from the pulp it is common to use a screw working a follower down upon the "cheese." This is simply a pile formed of successive layers of pulp confined by straw carefully laid, to confine the edges of the layers and retain the whole in a cubical mass. This method is imperfect in many ways. The trouble of laying the cheese is very great; the pressure of the screw cannot expel the juice from the interior of the mass with the same facility as from its more nearly external portions, and the juice is therefore not perfectly or uniformly expressed; and the power required to work the screw is very great, toward the close of the operation requiring the utmost exertion of three or four men. A better method is that now to some extent adopted in wine-making countries for expressing the juice of the grape. This is simply the use of the centrifugal machine, so long employed in bleacheries for expelling moisture from cloths, in sugar factories for drying sugar, and in some beet-root sugar establishments for separating, as in cider-making, the liquid from the pulp. Improved modes—such as we have indicated—for obtaining the cider itself from the fruit, combined with proper selection of apples and subsequent treatment of the cider itself, would produce a beverage far more pleasant and much less harmful than the sophisticated wines which are now so largely used, and at a greatly diminished cost.

SORTING AND COUNTING COIN.

THERE are few who would require the aid of machinery to assort or count their coin. But apparatus for the former purpose may find profitable employment in certain large mercantile and other establishments in countries where hard money still circulates. While devices for the mechanical enumeration of coin are a necessary adjunct in every mint, the market for mechanism for either use is probably too limited to offer much inducement to inventors in this line; but the construction of the latest or more approved varieties is of sufficient interest to deserve a paragraph devoted to them. A new English device for sorting pieces of solid currency is described as follows:—"The coins pass into a graduated series of rotary cylindrical sifters or sorting barrels, with internal spiral divisions, causing the coins to travel through and between each spiral thread; circular openings allow all the coins except the largest to drop through. The largest coins are delivered into a till, but the remainder pass through other barrels, until only the smallest ones remain."

For counting coins, the simplest and probably the best is that invented some years since by the "first coiner" one of the officers of the United States Mint at New Orleans, and used in all the different branches of the department. In front of the operator whose duty it is to do the count-

ing, is a rectangular trough, in the center of which is a standard, in the upper end of which is a wheel about one inch in axial thickness, and three inches in radius, and with its periphery of rounded or semicircular form. On this wheel is balanced the center of the counting-board, the front edge of which is grasped by the hands of the operator, by whom it can be shaken and tilted in any direction. On its upper surface it is subdivided, by ribs about one-eighth of an inch in height, into parallel spaces the width of the coin to be counted. A mass of coins being thrown haphazard on the board, the latter is deftly shaken and manipulated until the coins have arranged themselves snugly in the spaces, which extend not only across the board proper but also upon a hinged portion that, during the operation just mentioned, is kept in the same plane with the other by a suitable catch. As soon as the coins are brought to the required position, the hinged part is dropped, and the surplus pieces, that during the shaking have been brought upon this part, fall into the trough, to be again gathered and placed with a subsequent counting. As the board itself has a definite number of spaces, and each of these must hold a definite number of pieces, a simple multiplication of the one by the other gives without fail the actual number of coins upon the board, commonly five hundred. The board is then tilted to throw the coins into a hopper, which conducts them to the pan of a scale placed to receive them—a subsequent weighing serving to verify the count. A more simple and expeditious method of enumeration could hardly be imagined, and although it is hardly probable, it is at least possible that it might be used to advantage in counting things other and more common than minted metal pieces.

NOTES FROM OUR FRENCH EXCHANGES.

PROPELLING BALLOONS BY GAS ENGINES.—Concerning reports of recent German aeronautical experiments, M. Hubert has addressed a note to the French Academy, from which we extract:—

"That journal (the *Gazette* of Frankfort) says: We have assisted in experiments made in the *Halle aux Blis* with a model made by the inventor, and the result was most satisfactory. It has proved to us that an aerial ship can be steered. The construction is thoroughly new and original in this, that a gas motor is employed to maintain in motion an aerial screw, in such manner that the motor is fed from the balloon filled with gas. In consequence, it has neither furnace nor coal receptacle. The trials demonstrated that the machine could fly either in a right line or in a circle. The model moved rapidly, and on a large scale would doubtless have done so in a much greater degree, especially if the balloon be inflated not by the aid of gas from oil, but with hydrogen, which, being lighter and more powerful, will augment the carrying capacity of the balloon and the power of the motor.

"In several memoirs to the Academy, I have developed the principle that the necessary force to guide the balloon in any direction should be produced by the aid of two elements constantly carried by the aeronaut; gas the same as of the balloon itself, and the air. Furthermore, I have shown it possible to completely suppress ballast in utilizing the heat lost by the consumed gas as it leaves the cylinder of the machine after having produced its effect on the piston. This result is obtained by an arrangement analogous to the condenser of Watt's steam-engine. By different combinations comprised in the invention as a whole, I arrive at the double result; the obtention of relatively the greatest motive force possible—six horse-power indicated—and the reduction of the burden of the balloon to a minimum extremely low."—*Les Mondes.*

PURIFYING WATER FOR STEAM FROM LIME.—According to M. Champion, chemist, of the two methods of removing bicarbonate of lime from feed-water, viz., by heat or treatment by caustic lime, the latter is to be preferred. The water used in the trials contained three one-thousandths of dry residue; by the addition of caustic lime this was reduced to one one-thousandth. The milk of lime used for the purpose marked 17° Beaumé, and contained 200 grammes of lime to the liter of water, and the quantity required was about 850 grammes per cubic meter of water employed. As we have established, the proportion of bicarbonate of lime contained in the water varies frequently from the same wells; this can be explained by the contact more or less prolonged of waters charged with carbonic acid with the lime or marl forming the inferior bed of the wells. We must, therefore, frequently assure ourselves of the quality of the water purified by the process. To do this, it is only necessary to filter a small quantity, and test its neutrality with red litmus, thus guarding against an excess of lime, which is very important. The addition of several drops of oxalate of ammonia, which should not produce a precipitate except after several minutes of agitation, indicates in a certain manner that the proportion of lime is sufficient to remove the excess of carbonic acid. The water is rapidly separated from the calcareous carbonate (formed from excess of carbonic acid from the bicarbonate previously existing in the water, and any free carbonic in the water), by allowing it to repose for several hours after the process on sponge filters. This mode of purifying is used by the Chemin de Fer du Nord.—*Bulletin du Musée de Belgique.*

HORSEHOLD ENGINE.—M. H. Fontaine has presented before the *Société d'Encouragement* what he terms a *moteur domestique*. The machine placed before the council is heated by gas. It weighs about 160 kilogrammes, and its total height is 0·85 meters. It consumes 200 liters of gas per hour when in operation, and vaporizes one-half of a liter of water per hour. The boiler is vertical and tubular, and the fire, after enveloping the steam chamber for superheating, is connected by the base of the engine with the chimney in such manner that, by extending simply the pipes along the support, the machine may be placed at any desired distance from the chimney. The feeding of the boiler does not occur during the working of the engine, but only at one time, the beginning of the day, or at the workman's dinner hour. The capacity of the boiler is calculated for twelve liters of water and six of steam chamber; the heating surface is fifty square inches. A peculiar device is so arranged that the flow of gas is automatically proportioned to the expenditure of steam and the waste of heat by radiation. When the engine is not in operation, the length of the flame diminishes in order that the gas may burn in the quantity required to maintain the tension of the steam at a point to be determined in advance. When the motor is working, the flames elongate, become more active, and produce all the heat necessary for the formation and transfer of steam consumed by the apparatus. This device consists of a corrugated metallic tube, which must not possess any elasticity in itself, and which is maintained at a point determined in advance. This tube does not vary under the heaviest pressure, but the effect is transmitted from its interior to a counterweight, and the movements of this to the valve governing the admission of gas to the furnace. This acts also upon the generation of steam with the same result as a safety-valve, but without loss of power or steam. A machine of this kind can be placed in an apartment without danger, occupies but little space, requires but little care, costs but five hundred francs, and burns but two cubic meters of gas in ten hours of continuous work.—*Le Génie Industriel.*

Trinity Bells.

[From the *New York Evening Mail.*]

TRINITY CHURCH spire, from the street level to the top of the golden cross that surmounts it, is 284 feet high. The eager climber, in his pursuit of knowledge under difficulties, can only achieve the outlooking visitor's platform, which is at a height of 250 feet from the ground, and which is reached by various flights of ordinary steps, concluding with a narrow stairway, which in a darkened tower winds about a central stone pillar for the last hundred feet or so. The whole number of steps and stairs to be overcome is 308, and the last 80 or 100 are so nearly straight up and down as to be exceedingly fatiguing. Indeed, taking into consideration the narrowness of the tower, its darkness, and the short steps sharply curving round a central stem, an imaginative man might fancy himself in the bottom of a huge stone bottle trying to climb out by the cork-screw.

Twenty-five feet above the visitor's platform is the clock tower, through the circular windows of which the four large dials look toward the four cardinal points of the compass. These dials are accessible by mechanics, who, in case of accident to the hands of the clock face, can with much toil reach them by means of ladders. Above this still tower the spire and cross, far above the reach of any save the most adventurous climber, and only necessary to be reached in the case of some unusual and unforeseen accident. A number of years ago the cross was stuck by lightning, and for some days it remained at a most uncomfortable angle of inclination, until at last a cool-headed man was found to scale the perilous steep and set things right again.

The huge bells, though set on swinging frames, are lashed so as to be firm and fast, and but the iron tongues are movable, these being swung from the center to one side by means of a cord to each. The tongue always strikes in precisely the same spot on the lip of the bell, thus securing uniformity of vibration and certainty of tone. Each tongue or hammer is provided with a damper, on the plan of the damper to the strings of a piano, and for the same purpose—to prevent the undesirable prolongation of the sound, and the consequent running of the notes into each other.

The cord passes from the hammer of the bell down one story to the ringer's room; it is there attached to a long wooden bar, the leverage of which is so adjusted as to make the striking of the tongue as easy as possible. But even then the playing of a tune on Trinity bells is no child's play. Imagine nine large levers, each one, at the end where the hand touches it, as big as a drayman's handspike. The player takes off his coat, stands up to his work, and begins. Every note struck requires a sudden pull, or downward thrust of the lever, with a power which, if put into a

blow, would be sufficient to knock down the strongest man.

The "chime" at Trinity consists of nine bells, each of which weighs several hundred pounds, and the largest of them even running up into the thousands. The musical range is an octave and a quarter, and, of course, no air whose notes cannot, by the musician's ingenuity, be brought within the range of those nine notes can be properly performed. The usual semitones of the regular octave are of course preserved, but as the compass of the bells is so narrow, only the simpler melodies, and those which have but little variation between the highest and the lowest notes, can be played. No two bells are ever struck together, and such a thing as a "chord" is unknown in chiming. The notes follow one after another, somewhat like a child trying to play a tune on the piano with one finger.

Certain of the bells are connected with the church clock, the largest one being that whose deep, sonorous striking of the "hours" we all know so well; this is the highest of all the nine, and besides its regular duty of striking the hours, it forms one of the musical chime, and is amenable to the player's hand by means of the same machinery which works its smaller companions. The rest of the bells are much smaller, and strike the "quarters" of the hour. These a.l are, when required for playing regular music, disconnected from the clock-work, as their duties to the player and the clock would be very likely to seriously conflict. It would seem hardly correct to have "Hail Columbia" broken in upon by Nos. 1 and 4 striking up "quarter-past nine," or to have "Mear" or "Old Hundred" interrupted by "Big Ben" booming for the interesting but irrelevant information that it was twelve o'clock or any other hour.

Five of the bells, the large one and the four smaller ones which strike the "quarters," were brought here from England in the year 1846. Though for some time after that the bells were the pride and glory of the city, it was soon noticed that they only rang the same monotonous strain every hour, and the people desired something more and better. It being impossible for a musician to accomplish anything with a series of but five notes, it was resolved to add the necessary bells to complete the octave, and money was speedily raised for the purpose. The bells were made by a firm in Troy, N. Y., and when put in their places were found fully equal in tone to those made in Europe.

Improvement in Motive-power Engines.

The 136th meeting of the Society of Art, at the Massachusetts Institute of Technology, was held on Dec. 28.

Mr. J. A. H. Ellis gave a description of his process of using the heat in exhaust steam to produce power. By this process the same fuel now required to produce one hundred horse-power with an ordinary steam engine is made to produce two hundred and fifty horse-power, making a gain of one hundred and fifty per cent. in the amount of power obtained by the consumption of a pound of coal.

To accomplish this result two engines are used; they may be coupled together, or used independently, as desired. One of these engines is run by steam in the usual way, and its exhaust taken to heat the boiler that drives the other engine; this boiler is filled with a mixed volatile liquid, consisting principally of the bisulphide of carbon, which boils at one hundred and ten degrees Fahr., and at the temperature of exhaust steam gives a pressure of sixty-five pounds to the inch. This boiler is heated by passing the exhaust steam through its flues on its way from the cylinder to the atmosphere, and the vapor which is produced in it is used to drive the second engine; the exhaust vapor from this engine is condensed to liquid by cooling, and pumped into the boiler again, and used continuously, with very little loss.

Mr. Ellis has two engines arranged on this plan now running at the Atlantic Works in East Boston. Indicator-diagrams taken from these engines while doing their regular work show that, while the steam engine was producing 11 3-10 horse-power, the vapor engine, driven entirely by the heat of its exhaust, was producing 18 8-10 horse-power, and that the two together were giving 30 1-10 horse-power from the same fire previously required to produce 11 3-10 horse-power with the steam engine alone—showing a gain of one hundred and sixty-six per cent. in the amount of power obtained from the fuel by this process.

In cases where two mills using steam power are situated near each other, the exhaust from one of them can be taken to heat the boilers of the other, and no fuel, fireman, or chimney will be required; its engine will run continuouly without attention as long as the exhaust steam to heat its boilers is received; and the power obtained will be fifty per cent. greater than that of the steam-engine from which the exhaust is received.

There will be no danger of an explosion of the vapor boiler, as the heat of the exhaust steam will not carry the pressure above seventy pounds under any circumstances, and if all the liquid in it should be evaporated out, no injury would be done, as it would not be overheated or burned by the heat of the exhaust steam passing through it.

For steamships the advantages of this arrangement are still greater than for stationary engines, as only two-fifths of the coal now required to make a voyage would be needed; the space now occupied by this extra fuel could be used for additional freight; the boilers would also occupy much less room in the ship than is now required for the steam-boilers, and as no fire is used for the vapor-boilers, they can be placed in any part of the ship where space is of the least value.

The liquid used in these vapor-boilers costs one dollar per gallon, and the loss of it amounts to about one gallon per day for each forty horse-power produced, making the cost of the additional power obtained by this process two and one-half cents per day for each horse-power, or less than one-tenth the cost of steam-power.—*Boston Transcript.*

Another Aerostat.

Philadelphia has the latest flying machine, and this is what the *Post* of that city says about it:—The model embraces a cigar-shaped balloon, twelve feet long by six in diameter, and the car and machinery are suspended. A copper globe, one foot in diameter, is filled with compressed air, communicating through a hollow rod with a small engine, which drives three paddles on each side. When the compressed air is liberated, the paddles are driven at any degree of velocity, and can propel the machine at a speed of eight miles an hour. The paddles can be depressed and raised, and thus act as the steering apparatus. The success of the model was astonishing. The flying machine moved majestically through the air, sometimes in a circle of the room, sometimes in a straight line, and again revolving on an imaginary pivot, instantly obeying the touch of the operator.

COMMUNICATIONS

TO CORRESPONDENTS.

We wish our readers to understand that, in freely publishing communications, we do not hold ourselves responsible for the opinions of our correspondents, inasmuch as we may occasionally publish views opposed to our own.

Improved Effect implies Patentability.

Messrs. Editors:—Having been absent from home, I have but just seen the Artisan of Sept. 27, which contains decision of the Commissioner of Patents in the matter of application of David Eyman for Letters-Patent for improvement in machinery for the manufacture of spikes. Though this decision reverses the former practice of the office, it is a remarkably clear, common-sense exposition of the patent law. The Hon. M. D. Leggett is the first Commissioner of Patents, since my knowledge of the office, who has shown comprehensive knowledge of the principles of law. I therefore think it due to him, and to ourselves as scientists, artisans, and inventors, to express through the Artisan our full appreciation of at last having a Commissioner of Patents who is master of the situation. A. A.

Tenafly, N. J., Dec. 29, 1871.

NEW PUBLICATIONS.

Moore's Rural New Yorker: A National Illustrated Rural, Literary, and Family Newspaper. D. D. T. Moore, conducting editor and proprietor. Publication offices, No. 5 Beekman Street, New York City, and No. 82 Buffalo Street, Rochester, N. Y. Single copies $2 50 per annum.

This, foremost among the agricultural weeklies, makes its appearance with the new year in a shape somewhat different from, and more convenient than its former one. It is full of timely and well digested information for the farmer, useful items for the household, prominent facts of current news, and interesting general reading for all. Our farmer friends will find in *Moore's Rural* a trustworthy *vade-mecum* concerning tillage, manures, care of cattle, and agricultural industry in general, and will do well to avail themselves of the liberal club rates offered by the publishers.

Van Nostrand's Eclectic Magazine.—D. Van Nostrand, 23 Murray Street, New York City. —This compend of current technology, compiled from foreign and American sources, has reached its sixth volume, and the number for January, 1872, now before us, shows no falling off in the judicious selection of matter which has always characterized this periodical. The present number presents as a frontispiece a steel plate portrait of Major David Bates Douglas, an eminent American engineer, who was born in 1790 and died in 1849, and whose surveys, plans, drawing, and reports were adopted, in 1836, by the Commissioners having in charge the construction of the great Croton Dam, although through some misunderstanding the prosecution of the work itself was intrusted to other hands. Among the other more noticeable articles are notes on fire-brick, wrought girders and trusses, iron manufacture, the Euphrates Valley Railway, gases from the Bessemer converter, temperature and elasticity of steam, etc. etc.

A portion of the old Chicago Court-house bell has been sold at auction. The total weight was seven thousand two hundred pounds, and it brought $4,500.

NEW AMERICAN PATENTS.

WE give, as follows, notices of some of the most interesting inventions for which Letters-Patents of the United States have recently been issued :—

MANUFACTURE OF IRON AND STEEL.—Z. S. Durfee, New York City.—*Jan.* 2; ante-dated *Dec.* 16, 1871.—Among the most noticeable features of this invention is combining converting vessels with reverberatory furnaces and blast or smelting furnaces, in such a way as that the crude iron can be tapped and run or carried, raised, and poured from the blast furnaces into the reverberatory furnaces, and then, after being treated as may be desired, be tapped out and be run into converters. Also, so combining the apparatus used in the conversion of crude iron by the pneumatic or Bessemer process that the metal under treatment in the converters can be poured out and transferred to a reverberatory furnace and then tapped back into the converters.

WOOD-MOLDING MACHINE.—N. Jenkins, New Haven, Conn.—*Jan.* 2; ante-dated *Dec.* 14, 1871.—This invention comprises the combination of adjustable heads with their respective mandrels, constructed and arranged upon vertical posts, so as to adjust the work to the desired elevation. Also, in combination with the adjustable heads and their respective mandrels of a dial and setting point. Also, in combination with adjustable heads, the dial, setting point, and a lever for cutting irregular forms upon cylindrical surfaces.

SCOURING CASE FOR SMUT MACHINES AND HULLERS.—N. C. Page, Washington, D. C.—*Jan.* 2.—This is a scouring case or shell formed of two or more sections, composed of emery, spar, sand, or like gritty substance, molded in a suitable manner and cast with perforations.

GRAIN SCOURER AND CLEANER.—A. B. Paige, Washington, D. C.—*Jan.* 2.—The more noticeable features of novelty in this apparatus comprise a series of rotary agitators arranged alternately with a series of either revolving or stationary stones, in combination with a screen or grain holder and a horizontal shaft. Also, the agitators provided with radial arms, either straight or curved, and having sharp edges for dividing the grain, and pressing it against the sides of the stones or scouring surfaces. Also, the combination with a vertical series of stationary screens or grain holders, of a system of agitators and stones for repeating the process of scouring, and also for separating and polishing the grain. Also, a cylindrical screen or grain holder, when provided with slide-valves and discharge openings placed on the side and bottom of said screen or holder, in order to regulate the depth of grain therein.

BELT-TIGHTENER.—J. Albertson and D. W. Marmon, Richmond, Ind.—*Jan.* 2.—The more essential feature of this invention lies in the combination of a frame, bolt or pin, eye-bolt and lever, these parts being constructed and arranged for the purpose of allowing the tightening pulley to be set at an angle to the surface of the belt, and of furnishing the means for raising and lowering the outer end of the lever.

MACHINE FOR MAKING WHEELS.—E. A. Archibald, Methuen, Mass.—*Jan.* 2.—In this apparatus is used a felly bending and holding table or wheel, arranged to turn upon a center and having a semicircular series of concentrically located blocks, against which the felly is clamped throughout its length, to bring to a true semicircular shape for the formation of the spoke tenon sockets. Also, the combination of the rotary table and its series of clamping blocks, and with the boring tool or a radially arranged saw, or with both, of special mechanism for arresting the movement of the table and bringing it to a stop in proper position for the operations either of the saw or of the boring. The invention also includes certain other novel combinations of parts whereby the more efficient operation of the machine is secured.

FURNACE FOR STEAM GENERATORS.—W. F. Cox, Philadelphia, Pa.—*Jan.* 2.—This invention consists in the combination of a conduit into which the exhaust steam is discharged, and a flue or conduit leading from the fire-box or combustion-chamber, when arranged in such relation with each other and with other parts that flame drawn down through the latter by an induced draught, mingling with such steam, would superheat or dry the same before it is allowed to pass into such fire-box or combustion-chamber.

IRON COLUMN.—W. A. Gunn, Lexington, Va.—*Jan.* 2.—This is a metallic column composed of three double T-bars, the first two parallel with each other and the third placed centrally at right angles thereto.

MACHINE FOR DRESSING LEATHER.—C. A. McDonald, Woburn, Mass.—*Jan.* 3.—This includes a novel construction of a tool-carrier, consisting of a base-plate, clamp-bar, and intermediate plate. Also, a sleeking-tool of peculiar construction, and so applied as to stand at an angle with the bed, in combination with a swinging frame for carrying the tool.

CHIME, ALARM, AND OTHER BELLS.—G. R. Meneely, West Troy, N. Y.—*Jan.* 2.—In this device there is combined with the bell a swinging clapper suspended in the bell, and a clapper-retracting spring secured in or to the upper part of the bell and connected to the clapper and contracted to operate thereon.

LAMP FOR STREETS, ETC.—T. A. Skelton, County of Middlesex, England.—*Jan.* 2.—For street-lamps the inventor claims the manufacture, application, and use of reflectors or glass prisms, or prismoids, or of a combination of reflectors, prisms, or prismoids, hermetically or otherwise sufficiently inclosed between plates of glass.

HARVESTER.—J. Bordwell, Brockport, N. Y.—*Jan.* 2.—The novelty in this improvement is found mainly in the combination of the main frame, the main axle turning therein, the driving-wheels, the backing-ratchets inclosed therein, the spur-gear fast on one of the flanged collars of the ratchets, the spur-pinions on the counter-shaft, and a sliding clutch in the universal-joint connection of the counter-shaft, all the parts being constructed and arranged for joint operation.

ELECTRO-MAGNET FOR NOTING METEOROLOGICAL CHANGES.—S. Chester, Elizabeth, N. J.—*Jan.* 2.—This inventor claims an automatic apparatus operated by electro-magnetism or electricity, for indicating at a distance meteorological and other phenomena. Among the salient features of the apparatus is a current-changer, consisting of a revolving cam operated by clockwork, bearing successively against a series of plates connected with the different branches of an electric circuit. Also, an apparatus transmitting currents of electricity during a certain unit of time, corresponding in intensity to the variations from a fixed point during said time of instruments indicating meteorological and other varying phenomena.

TREATING VEGETABLE OILS.—R. T. Clarke, Covington, Ky.—*Jan.* 2.—In this process the vegetable oils are agitated by mechanical means before or during the presentation of lead to said oils, as a distinct part of their purification. Of several distinct features of the process may be noted the presentation of lead to the vegetable oils during or after their agitation, such presentation being made without the addition of heat in any form. Also, the introduction by pressure of air when pure and cold into vegetable oils, as a supplement to their agitation and as an optional part of the process. Also, the introduction of water alone, and when separated from any other element, into said oils after their agitation and treatment with lead, for the purpose of precipitating the parenchymous and extraneous matters in said oils, and not simply for washing them.

COMBINATION PAVEMENT.—L. S. Filbert and J. Taylor, New York City.—*Jan.* 2.—The most salient feature of this new pavement exists in the combination of a series of wooden blocks cut into a suitable form, so as to leave a groove between the rows, and filling in said grooves with a vulcanite composition to cause the parts to adhere, and resting the entire structure on a suitable foundation.

VACUUM APPARATUS FOR TREATING DISEASES.—S. Pasco, Delavan, Wis.—*Jan.* 2.—This invention includes the use of surgical cups and receivers constructed of compound metals, applied to the human body and exhausted of air by suitable appliances.

PROCESS FOR CLEANING COFFEE.—W. H. Butler, Chicago, Ill.—*Jan.* 2.—This process consists in cleansing or scouring coffee by the agitation of the coffee together with the sand in a vessel, whereby the coffee is cleansed by attrition against the sand.

CASTING INGOTS.—D. S. Durfee, New York City.—*Jan.* 2.—This inventor's claim covers making long shafts or other pieces of steel by first casting ingots in a bent form, and then straightening and drawing and condensing said ingots. Also, a novel arrangement and construction of molds for molding bent ingots.

CAR-WHEEL.—F. W. Townrow, U. S. Navy.—*Jan.* 2.—The novel feature of this invention consists in an annular channel of circular form in its cross-section, one-half of which is in the outer periphery of the hub or central part of the wheel, and the other half in the inner periphery of the rim section, in combination with metallic spheres appropriately arranged to secure the object of the invention.

PROTECTING BUILDINGS FROM FIRE.—W. D. Baker, East Abingdon, Mass.—*Jan.* 2.—This includes a novel arrangement of a water-space chamber or chambers, and the induct and educt thereof, with two buildings and either or both roofs of the same, so as to preserve the buildings and their contents from conflagration.

ARGAND GAS-BURNER.—H. W. Hayden, Waterbury, Conn.—*Jan.* 2; ante-dated *Dec.* 19, 1871.—This improved argand burner is made with a tube connected at the lower end to a coupling, and containing an interior air-tube and elbow, in combination with a suitably arranged air-distributor and chimney-holder.

TREADLE FOR SEWING-MACHINE.—J. H. Whitney, Rochester, Minn.—*Jan.* 2.—In this apparatus the treadles are pivoted at their forward ends, and provided with arms in combination with a vibrating lever arranged for joint operation therewith. Also, there is employed, in combination with the treadles and with the lever, a base or support provided with ears for attaching it to an ordinary sewing-machine.

CANAL BOAT.—C. W. Hermance, Schuylersville, N. Y.—*Jan.* 2.—The salient points of this invention lie in the combination, in a canal or other boat, of a buoyed false bow, closed at its top and bottom, and open at its rear end, and made of a size to correspond with the size and shape of the bow of the boat. Also, in the combination, in a canal boat, of a recess, opening, inclined plane, and bottom, the whole arranged in suitable relation with each other to facilate the navigation of canals.

Saccharine Postage Stamps.

AN ingenious Yankee was before the Postmaster-General the other day with a postage stamp that had on its adhesive side a taste of choice candy. One sort had chocolate, another orange, a third lemon, and so through the list of popular sweetmeats. The inventor urged increased sales and waste that would come from this improvement. The Postmaster-General reserved his decision as to the advisability of the Government buying out the confectionery business.

An Old House.

THERE is a house still standing in Greenland, N. H., which was built in 1638, and is consequently 233 years old. It is a two-story brick building, with high gable ends. It has a crack in one of the walls, supposed to have been caused by an earthquake about a century ago.

Quick Transit to the South.

THE *Commercial Bulletin*, of New Orleans, says that about June or July next passengers will be conveyed from that city to New York in fifty-six hours. The distance by the established routes being a little less than 1,400 miles, this would be at the rate of twenty-five miles an hour.

THE Cosmopolitan Oil-well, at Scrub Grass, Venango County, Pa., caught fire on Dec. 26, from an explosion of gas, and six men, including Mr. Botsford, superintendent, were severely burned. The derrick at the well was consumed, but the flames were soon extinguished.

Stellar Photography.

At a recent meeting of the Polytechnic Association, the Chairman, Prof. S. D. Tillman, remarked that "Mr. Rutherford, of New York City, has been quietly doing a work which will be consulted 5,000 years after we are forgotten, in photographing groups of stars, by which their positions are exactly recorded, without the error of personal equation." In response to this, Mr. Chapman, who has been associated with Mr. Rutherford in the work, sketched as follows the method pursued: "The groups of stars are photographed twice a year, six months apart. The telescope takes directly a field of about two degrees. There is a little distortion, but that can be ascertained mathematically and applied as a correction. Some of the groups contain as many as 125 stars, down to the ninth magnitude, taken upon a plate 5½ inches square. A star suspected of proper motion is placed in the centre of the plate. The plate is exposed six minutes, and then the telescope is moved slightly, and the plate is exposed six minutes longer, duplicating all the stars upon the same plate, so as to identify them from other spots upon the plate, and verify their positions. Then the clock-work is detached, and, after a certain length of time, the clock is again attached, and a supplemental exposure is made, which furnishes us the base line, or zero of position. With the micrometer, each star is determined in position by its distance from the central star, and by the angle of the line from it to the central star with the east and west line. In order to get rid of any constant error from the direction of the telescope, we usually take the stars with the telescope first on one side of the pier, and then, when the stars are in a different position, with the telescope upon the other side of the pier. By repeating the groups six months apart, we hope, by-and-by, to ascertain the amount of parallax of some of them. We thus have an absolute map of these groups for future use. On a cloudy day a young lady sits down and measures the positions of those stars. In making the telescope achromatic for actinic rays, the 13-inch objective was first corrected for the visual rays as perfectly as possible. Then a flint glass meniscus lens was constructed to be placed in part of the objective, shortening the focus about one-seventh, which was corrected by the aid of the spectroscope, until the whole combination was perfectly corrected for the actinic rays."

Canadian vs. American Ship-building.

The St. John *Telegraph* gives a glowing account of the ship-building interest in New Brunswick and Nova Scotia, which is tantalizing to our long-suffering and patient ship-builders. In 1871, twenty-seven thousand tuns of shipping were built in St. John Harbor and its immediate neighborhood. Of the vessels built, four were steamers, four were ships, twenty-two were barks, and twenty-two were schooners. Superior vessels have been built and fully equipped for sea for thirty-five dollars per tun, while many have been constructed even for twenty-nine dollars per tun. The profit of the business has been so great that extensive preparations are making for an increase of the business the present year. The *Telegraph* publishes a list of thirty-three new vessels already contracted for in the neighborhood of St. John and Nova Scotia.

These facts ought to have some influence in leading Congress to relieve our ship-builders of the outrageous burdens under which they labor. While St. John is annually building first-class vessels by the dozen, the old ship-building ports of the neighboring State of Maine are launching but two or three vessels of inferior grade. Bangor, Portland, Bath, Belfast, and a score of other places, which formerly did such a thriving business in building and furnishing ships, now find their ship-yards decaying, and other industries which depended upon them also declining or ruined. There is no lack of capital in those places, and labor is plenty and cheap.—*N. Y. Evening Post.*

Schools of the Cooper Union.

From the report of the director, F. G. Tisdall, Jun., A.M., of the evening schools to the Trustees of the Cooper Union, it appears that the average attendance of the School of Science and Art for the month of December, 1871, was, in the scientific classes, 381; scientific drawing classes, 220; in the art classes, 413; in oratory and debate, 40. Besides this, many persons attend the free lectures on science which are delivered every evening by the Professors of Chemistry and Natural Philosophy, etc. A laboratory has been handsomely fitted up, and instruction given in chemical analysis by an experienced assistant. The trustees have succeeded in rendering the school unique, higher instruction being given in science and art than in any evening school in this country, if not in the world. The average attendance in geometry was 73; in algebra, 72; being a larger total than in most colleges. So great has been the pressure of applicants that, during November and December, no less than 430 applicants were admitted. The average monthly attendance has been:—October, 1,026; November, 1,086; December, 1,054. Applicants are received every Wednesday and Thursday evening, at eight o'clock, in the office, by Prof. Tisdall.

Life-saving Apparatus of the New Jersey Coast.

The expenditures made by the Government for increasing the efficiency of the life-saving stations on the New Jersey coast have already brought ample compensating returns. During the last month no less than seventy persons have been rescued by the service men with their life-saving apparatus. In one case, last week, a crew of fifteen persons were rescued from a vessel ashore at Squan Beach, and safely landed. But for the additions made to the force and apparatus at the various stations, the loss of life would probably have been total in nearly every case of shipwreck. It is said that the Government expects to be able to extend the usefulness of this branch of the service, in like manner, along Cape Cod and also on the coast of North Carolina.

Farm Products of the United States.—The total value of farm products in the United States and Territories during the year ending June 1, 1870, according to the census statement just published, was $2,445,000,000. The largest product was in New York, and the next largest in Illinois. The total wool clip for the same year is stated at 101,284,678 pounds, of which about one-fifth is credited to Ohio.

The Boston *Journal* announces, as a rare occurrence, the arrival at that port of a vessel laden with 500 tuns of white cliff stone, quarried near the sea-shore on the Island of Negropont, in the Greek Archipelago. This is the first importation into Boston of that kind of stone. It has a white, chalky appearance, and is used for the manufacture of an artificial stone, and of rare beauty and polish.

Stimulants of the World.

Coffee leaves are taken, in the form of infusion, by 2,000,000 of the world's inhabitants; Paraguay tea is taken by 10,000,000; coca (the Peruvian stimulant), by 10,000,000; chiccory, either pure or mixed with coffee, by 40,000,000; cacao, as chocolate or in some other form, by 50,000,000; hashish is eaten and smoked by 300,000,000; opium by 400,000,000; Chinese tea is drunk by 500,000,000. Finally, all the known nations of the world are addicted to the use of tobacco, chiefly by smoking, and nearly all to the use of some form of alcohol.

A New English Seaport.

The Dukes of Buccleuch and Devonshire, with whom are associated a number of opulent English capitalists, have set about creating a great port on the Lancashire coast to rival Liverpool. The site is Barrow-in-Furness, and is not unknown to the mercantile world in connection with its Bessemer steel-works, which yield a profit of £500,000. There has also been erected there, quite recently, a very extensive jute-works.

The Children's Aid Society.

During the past year, in the fine lodging-houses of the Children's Aid Society, 11,928 different boys and girls were lodged, and 157,729 meals and 131,573 lodgings were supplied. In the 19 day and 11 evening industrial schools were 9,429 children, who were taught, and partly fed and clothed; 3,336 were sent to good houses, mainly in the West. Total number under charge of the Society, during the year, 27,743. There have been 4,953 orphans in the lodging-houses, and 1,231 orphans were provided with homes.

Exports of Richmond, Va.—The exports from Richmond, Va., direct to foreign ports during the month of November were 216 hogsheads of leaf-tobacco to Trieste, valued at $45,800, and 3,512 barrels of flour at Brazil, valued at $31,316. The imports during the month were 7,609 sacks of salt from Liverpool, and 3,052 bars railroad iron.

A paper collar company at Albany makes sixty thousand collars and cuffs a day.

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United States and Foreign

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Messrs. BROWN, COOMBS & Co. are prepared to furnish to persons residing at a distance from New York—free of charge—*written opinions* as to whether Inventions contain any features of patentable novelty; to do this they simply require a sketch or rough model of the Machine or other Invention that is supposed to be new, together with a brief description of the same; and as soon as possible thereafter a letter of the best advice is mailed to the person desiring the information. These opinions are formed from their own mature experience, and may generally be relied upon. In some few instances, however, it may be desirable to have a *preliminary examination* made in the United States Patent Office in Washington, in which city Messrs. BROWN, COOMBS & Co. have a *Branch Office* for the transaction of such business as can only be satisfactorily performed in that city. For this extra service the small fee of $5 is payable in advance.

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In making application under the new law of 1870 for a United States Patent for an Invention, the first instalment of the Government fee is $15, which sum—together with fifty cents revenue stamp-tax on the power-of-attorney—*is payable in advance* on applying for the Patent, and $20 additional are due to the Government when the Letters-Patent are allowed. The agency fee charged by Messrs. BROWN, COOMBS & Co. is from $25 upward, according to the labor involved, but in all cases their charges will be as moderate as possible for the preparation of drawings and all necessary documents. This fee is not payable until after the application has been prepared and the case is ready to be sent to Washington, and it includes all necessary services performed by Messrs. BROWN, COOMBS & Co. through their *Branch Office* in Washington, to secure the speedy and certain issue of the Patent.

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One of the provisions of the new law is that for the protection of TRADE-MARKS by registration in the United States Patent Office. Heretofore, Trade-marks—except so far as particular designs could be patented—were only protected in a loose and uncertain manner by the State courts; but now the United States offers definite and certain protection for the term of thirty years, at a fee of $25. Messrs. BROWN, COOMBS & Co. obtain these protections upon the most reasonable terms, according to the nature of the case.

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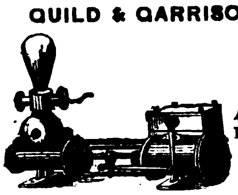

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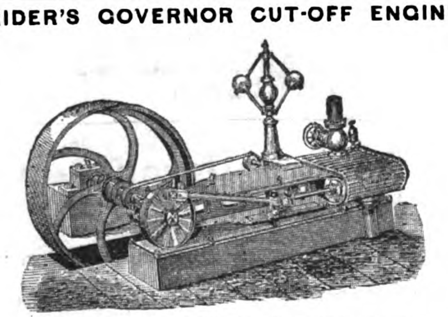

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VOLUME XIV. New Series. } NUMBER 4. NEW YORK, JANUARY 24, 1872. { $2 00 PER ANNUM IN ADVANCE. SINGLE COPIES, FIVE CENTS.

CONTENTS OF THIS NUMBER

[Illustrations are indicated by an asterisk.]

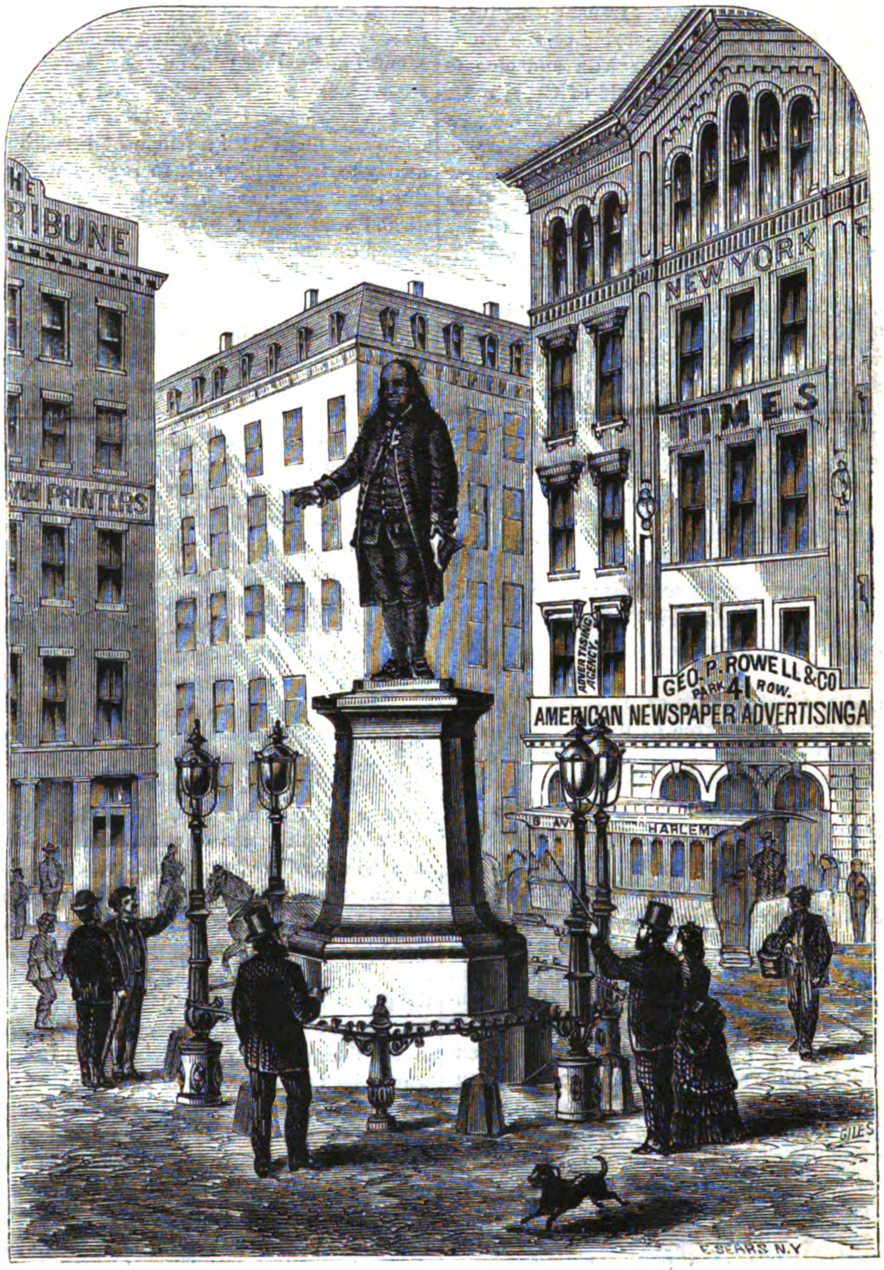
The Franklin Statue.

WHEN, in October, 1723, Benjamin Franklin came first to the city of New York, there was not in the little Dutch town a single newspaper office, and the apprentice boy who ran away from his brother's printing-office, in Philadelphia, found in the future metropolis of the continent no rest for his feet or work for his hands. But one hundred and forty years later, when the genius, the patriotism, and, not less than these, the homely common sense of the wanderer have been for a century interwoven with the history of his country, his statue is erected in New York. This has not been done by any uprising of popular fervor, but in the spontaneous generosity of an artist, Capt. Albert De Groot, who has presented the work to the city. The statue was unveiled on the 17th day of January, amid the salvos of cannon, and hailed by orations by famous men, the *locale* being, very appropriately, in Printing House Square, surrounded by the offices of the leading daily journals of New York. Our engraving represents the statue as placed on its pedestal, and facing the City Hall. It is of bronze, of colossal size, mounted upon a handsome pedestal of granite. It represents Franklin in court dress, with the right hand outstretched as if he were in the act of speaking, while a newspaper is held in the left.

At 12 o'clock, on the day mentioned, the committee of arrangements and invited guests entered the inclosure and ascended the platform. Among those present were Horace Greeley, Prof. S. F. B. Morse, Peter Cooper, Benjamin Franklin Bache (a descendant of the great printer), James Brooks, Sinclair Tousey, Douglas Taylor, Capt. De Groot, and a large number of old or prominent printers.

After music by the band, the Rev. Dr. Irenæus Prime, with a few remarks of congratulation on the fact that a statue of Franklin, after too long delay, was at last erected in this city, introduced the Rev. Dr. Deems, who offered prayer.

Douglas Taylor, chairman of the committee of arrangements, then introduced Prof. Morse, who said that he esteemed it one of his highest honors that he had been designated to perform the office of unveiling this statue. When requested to accept this duty he was confined to his bed, but he could not refuse, and said, "Yes, if I have to be lifted to the spot." No one had more reason to venerate Franklin than himself. He closed by expressing the hope that Franklin's illustrious ex



THE FRANKLIN STATUE.

ample of devotion to the interests of universal humanity would be the seed of further fruit for the good of mankind.

The statue was then unveiled. As the drapery fell from the figure, the "Star-Spangled Banner" was played by the band, loud cheers arose from the crowd, and a salute of artillery was fired in the Park.

Horace Greeley was then introduced and received with applause. He said that one of his craft had suggested the idea that a statue of Franklin would be appropriate in this city, which has now become the great center of American printing and book-publishing. This suggestion was made to Capt. De Groot, who, in acknowledgment, as he said, of many favors received from the press and printers of New York, determined himself to present them with such a statue.

To execute his design, he called in the assistance of Ernest Plaismann, who executed the work with the greatest care and deliberation, submit-

ting it, at various stages, to the examination of the most competent critics. We had reason, therefore, to believe that the statue was a faithful representation of the original, and to congratulate ourselves that, if better work of the kind can be done, the way to the accomplishment of it has been opened.

The speaker said he rejoiced that so fine an American statue of an illustrious American had been produced, and also that the American who is the immediate successor of Franklin had been spared to take part in the ceremonies of its dedication. He alluded to the fact that Prof. Morse was born the year after Franklin's death and within a rifle-shot of the latter's birthplace, and said that he seemed to have been raised up by Providence for the express purpose of completing the work which Franklin began. Franklin conquered the lightning and rendered it harmless. Morse made it a useful agent of man, transmitting intelligence by a flash from one quarter of the globe to another. In honor to Franklin and also to Morse, he took pleasure, in behalf of Captain De Groot, in presenting this statue to his craft.

After music by the band, Charles C. Savage, president of the board of trustees of the New York Typographical Society, delivered the address of acceptance. After extended reference to the topic of the day, Mr. Savage turned to Prof. Morse and welcomed his participation in the ceremonies, saying that wherever the iron nerves traverse the earth, the names of Franklin and Morse will be known and linked. He closed by thanking Capt. De Groot for his gift, in behalf of the press and printers of New York, whom he pledged to guard the trust with the vigilance of love. The assembly then dispersed.

CAR PROPULSION BY PNEUMATIC POWER.

BY JAMES A. WHITNEY, MECHANICAL ENGINEER.*

[Continued from page 34.]

In further reference to each of the three classes of pneumatic apparatus sketched in the earlier portion of the present paper, it is necessary to consider in each the degree of utility thus far attained with it; the most feasible methods of obviating its defects; and the conditions under which it may be most advantageously adapted to the needs of travel in New York City. For whatever, in this line, can be made practically successful under the drawbacks encountered in the metropolis, need excite no apprehensions of failure in any other locality. First in importance, as in the date of its original conception, is Medhurst's earliest scheme, known of late years in England as Rammell's system, from its—in recent times—most prominent advocate, and illustrated in this country by that fragmentary undertaking, the pneumatic tunnel under Broadway, which, with a passenger car running a distance of three hundred feet, has confirmed, on this side of the ocean, the favorable expectations induced from Rammell's experiments, in 1861, with baggage trucks driven a quarter of a mile through a cast-iron tube or tunnel of two feet nine inches height, and a width of two feet four inches, narrowed at the bottom to two feet two inches. This line was worked by the partial exhaustion of the air in front of the car, and, with a pressure behind of from four to six ounces to the square inch, a speed of twenty-five miles an hour was obtained. Four years later, the completion of the tunnel from Holborn to Easton, one and three-fourths miles, afforded opportunity for more complete, definite, and decisive trial. This tube in its cross section was of horseshoe form, four feet six inches high, and four feet across. In lieu of the longitudinal shoulders which, in the experimental line, had been made to do duty for rails, common wrought rails were employed, fixed upon suitable bed timbers arranged lengthwise under them. The goods trucks weighed each a tun and a half. A train of four trucks with an aggregate weight of ten tuns was forced through the tube with a blowing pressure of five to six ounces per square inch, or a vacuum equal to about one ounce less, and this at a speed in no degree inferior to that obtained in the previous or purely experimental trials. The expense of transport for freight was found by careful calculation to be less than one penny, or two cents, per tun per mile, including interest on cost of engine, wear-and-tear, fuel, attendance, and incidental work in the establishment. About the same time another trial on a large scale was made with a brick tunnel six hundred yards long, nine feet in height, and eight feet in width. The carriage was fitted with a fringe of bristles reaching nearly to the brickwork to reduce windage, and the twenty-foot fan by which the blast was furnished was driven by an old locomotive engine jacked up, and with belt-wheels substituted for its drivers. Only a small portion of this line was level; it had at one place a gradient of one in fifteen, and curves of only eight chains radius. The car traversed the whole distance in fifty seconds, with an atmospheric pressure of two ounces and a half to the square inch. On the whole, without adverting to more extended or more recent trials, it may be assumed that, years ago, experience demonstrated the feasibility of propelling cars through tunnels by atmospheric pressure at from twenty to forty miles an hour, while theoretically, by the use combined of an air-blast and vacuum, the probability of securing a speed nearly or quite twice as great is apparent. But in the running of cars for a distance equal to that between the upper and lower parts of Manhattan Island, numerous details would require to be worked out and adjusted to secure the practical success of the system. Among these would be that of arranging for the stoppage of one car or train without interference with others in motion along the route, and which in the use of a vacuum would necessitate the adoption of a plan equivalent to the valve-separated sections of Clegg and Samuda in their otherwise quite different plan. It is true that, by the use of an air-blast only, a continuous line of cars might be propelled by what might be termed the air cushion throughout the length of the tube, but in the event of the stoppage of the foremost on the line, danger of collision from those behind would be imminent. It is possible that modifications of the turnouts applied in pneumatic tubes for the transmission of parcels could be applied in those for passenger transit. That of Needham, an American invention, brought forward during the past few years, comprised a circuit tube, with ends connected at a suitable distance apart with the main or transit tube, and used in connection with valves which shut off, in the space between the ends of the circuit tube, a portion somewhat longer than the carrier or piston. One of the valves was shut in front until the carrier, cushioned by the air in front, was stopped. The other valve in rear was then closed, the blast being thus directed through the circuit tube around the inclosed portion of the main tube. The top of such portion, hinged for the purpose, was then opened to admit access to the carrier. With the circuit tube entering the main at a slight angle, and with automatic switch-operating mechanism to shift the rails, there seems no good reason to doubt that, by means substantially like those just detailed, cars in an eight or ten foot pneumatic tube could be stopped at stations without interfering with the continued passage past of cars previously behind them in the tube.

The points to which reference has just been had wherein the development of improvements is still required, are not so abstruse as to leave any doubt as to the practicability of securing them, neither can there be much doubt as to the conditions, and the sole conditions, under which the system can be applied in New York and other cities. That pneumatic tunnels, of only a few feet diameter, dark in spite of gas-jets, and damp in spite of the ever fresh current of air, are not adapted to popular needs and wishes, is shown by the fact that the projectors of the Broadway Tunnel are already agitating for the privilege of making a tunnel thirty feet in width, in which this plan of pneumatic propulsion will prove inadmissible. That its use on the surface is out of the question is manifest at a glance. There remains then only an elevated railway as affording an opportunity for its use, and with such it would prove superior to any other method of propulsion yet suggested. Let an elevated pneumatic tube be carried over the buildings and cross-streets, sustained on iron supports constructed on the principle of a suspension bridge over each block; let this tube be of wrought iron for strength and lightness; lined with wood for moderate warmth and for reduction of friction to the air-blast; glazed throughout its length with panes of sufficient size and numbers to light it well, furnished with turnouts, to enable one car to be stopped at every station without interference with the others; furnished with electric signals automatically actuated by the cars themselves to indicate their approach to the stations; and place the working of the line, from the lowest duty to the highest, in the hands of educated, careful, and properly remunerated engineers, and the question of quick transit, in one of its phases at least, will be solved with greater satisfaction to the public and credit to the engineering profession than the most ardent advocates of speedy passenger travel now dare hope for. The lighting of the tube by windows, which would constitute a most essential element of success, would not, as might at first appear, be a matter of much practical difficulty. Although brittle, glass is comparatively strong, and would resist many times the pressure required to be brought upon it in working the line. An example, apropos in this connection, of the ability of glass to resist pressure, was given some years since in steam-boiler experiments of the Franklin Institute, in which the plate-glass window of a boiler withstood the pressure until it rose suddenly to one hundred and eighty pounds to the square inch.

Allusion has already been made to the proposed supersession of the present Broadway tunnel of eight feet diameter by one thirty-one feet in width, eighteen in height, and furnished with double tracks. In the plans made public, no information is given as to the motive-power proposed, but it is manifest that cars running in opposite directions could not, unless the tunnel be longitudinally partitioned from end to end, be propelled by the fan-blast or exhaust used in the present experimental work. It is hardly likely that the folly of wire ropes will be repeated in this case,

* Paper read before the New York Society of Practical Engineering, Jan. 8, 1872.

or that the slow power of horses will be used on a railway built at such cost. Locomotives may be attempted, but their employment, because of smoke, foul air, and jar to the foundations of buildings, should not be tolerated. The motive-power for such an underground line is not of less importance than the construction of the line itself, and the latter should, from the first, be calculated with especial reference to the former. Although the suggestion is not free from difficulties, there is good reason for the belief that the Clegg and Samuda system, a tube with a longitudinal valve-covered slot in the top, and an internal piston connected with the car running on an external track, would effectually subserve the purpose of transit through such a passage-way under the streets. During the existence of the line between Kingston and Dalkey, a gross load of fifty tuns was at times propelled at a speed of fifty miles at hour, the gradient being one in one hundred and fifteen, the diameter of the main fifteen inches, the vacuum at the greatest equal to twenty-five inches of mercury, and the engine of one hundred horse-power. The leakage of the valve absorbed about ten horse-power per mile, or thirty horse-power per section of three miles. The cost of such a railway, laid on the surface, was about twenty-five thousand dollars per mile, at the prices of labor and material a quarter of a century or more ago. The loss of power by leakage through the valve appears to have amounted to from one-fourth to one-third of the whole. But this, while serious when in direct competition with locomotives, would be of minor consequence when the great patronage of a New York City railway warranted unusual outlay, and, as far as the ventilation at the tunnel is concerned, would prove a positive benefit to the line, though at the cost of fuel for the engine. It must be remembered, too, that the valves devised by Clegg and other projectors of his time were before the introduction of india-rubber, a substance better than any other adapted to such a purpose. There is apparently no good reason why a strip of caoutchouc so applied as to press laterally over the longitudinal opening in the tube, should not serve. in a much more efficient degree, all the functions of the complicated device of Clegg and Samuda's railway. Should it prove too slight in tensile strength, a wire rope could be imbedded within it, and should its yielding power be found insufficient, this essential could be increased by giving a cellular consistence to the material by methods already known. The deterioration which would occur from contact of oil or grease necessarily used for lubrication, would, in the use of india-rubber as just indicated, require that it have cemented upon it a covering of leather or the like.

While there can be no doubt that both an elevated and underground railway, properly constructed, will meet with the most extended and profitable patronage from the citizens of New York, there is no reason to suppose that the surface lines will ever be given up, and on them some motive-power other than horses or steam should be provided. Of the several systems of pneumatic propulsion, that which embraces tanks of compressed air, serving in lieu of steam in the driving of engine pistons, is the only one adapted to the purpose. A number of trials have been made during the past few years with alleged satisfactory results, but it is doubtful if the chief obstacles to its employment at all seasons of the year have been overcome. Among recent inventions designed to increase the utility of the system is one in which the tanks are to be made of paper, obviously to prevent as far as possible the loss of power by radiation of heat generated from the compression of air in the tanks; another covers the use of a number of cylinders connected by tubes to form together the compressed air reservoir of the car, and which admits of a more convenient arrangement of as well as greater strength in such reservoir. The inventor of this also claims the combination with the heating apparatus of the car of a conducting pipe from the reservoir in such a way that the compressed air, while passing to the engine, may be heated to increase its expansive power, while still another feature of his apparatus is a muffler or box lined with soft fibrous material, to receive the exhaust from the engine and deaden its sound.

The plan of making the reservoir of non-conducting material might possess a certain advantage if the air could be used as soon as compressed, or before time for any considerable radiation had been afforded. The arrangement of the air-holding cylinders in connection with each other would afford in some cases a source of convenience, but would not be essential to the arrangement of the cylinders with regard to economy of space, as the cylinders might, in succession, be brought in communication with the engines. The need of the muffler seems doubtful, and, as the air could hardly leave the cylinders quite reduced to atmospheric pressure, it would probably be much better to throw the exhaust into the car-heating furnace in winter to urge the blast, and in summer into the body of the car to cool the atmosphere therein. The heating of the compressed air to increase its power of expansion would be likely to be of advantage only when incidentally incurred in protecting the cylinders from the congelation of vapor contained in the air, and liable to be frozen by the absorption of heat by the expansion of the air in working the engine. To this end, it would be advisable to arrange the cylinders within annular jackets in open communication with the furnace used for warming the car, and which should be constructed with especial reference to this use in connection with the driving motor. This last should furthermore be so applied in connection with the brakes, that the throw of a lever would instantly turn the pneumatic power from the propulsion of the car to its stoppage, which, by this means, could probably be accomplished in less time and within a shorter space than could be done with horses at an equal speed. There is in addition to those just specified another point which is now beginning to attract the attention it deserves, viz., the regulation of the inflow of air to the cylinders. This has been accomplished, it is claimed, by very simple devices, and, indeed, the mechanism need not be complex, for the connection of the stem of a pressure-gauge with a valve governing the size of the cylinder inlet-ports would seem to fully embrace the principle of an efficient device for the purpose.

The elements enumerated as essential to the success of the system will necessitate the construction of a street car radically different from those now in use, especially in the matter of weight. But there should be no difficulty in reducing the weight of the car, so as not to exceed, with its engines and reservoir, nine thousand pounds, the weight of the clumsy vehicles that now traverse the tramways of New York.

In conclusion, such in brief are the ideas of the writer on the most important application yet suggested of so-called pneumatic power. As to how far they will ever reach fruition in the solution of the vexed question of city transit, it is impossible to say. But they have been deduced, without reference to any especial plan or theory, from the actual results of recorded practice not less than from the well-known laws of science, and have led him to believe that passengers may be cheaply carried to and from the City Hall at from twenty to forty miles an hour with all the comfort of ordinary railways, and none of the dangers or inconveniences incident to the employment of locomotives.

Steam Ferry between France and England.

THE commission of the Assembly to whom the subject was referred has made a report approving the project of a steam ferry across the Straits of Dover, between the towns of Dover and Calais.

The commission sat at the Prefecture of Arras and heard the arguments advanced by the projectors, among whom are the well-known French naval architect, M. Dupuy de Lowe, president of the Conseil d'Etude; M. Drouyn de Lhuys, the well-known Imperialist minister; Mr. Scott Russell, the builder of the *Great Eastern*, and others. M. Dupuy de Lowe acts in his own name and in that of the Société des Forges et Chautiers de la Mediterranée.

The leading features in the new project are the construction of three large and powerfully-engined steamers, the dimensions of which will be:—Length over all, 450 feet; breadth at water-line, 50 feet; depth, from deck to bottom of the hold, 32 feet; deck-house, 8 feet; draught of water when loaded, 13 feet 3 inches; displacement, 4,000 tuns; diameter of paddle-wheel, 50 feet; immersion of paddle-wheel, 10 feet. Each wheel will be driven by an engine of 700 horse-power nominal, capable of working up to 3,500, giving an aggregate of 7,000 horses to each vessel. The two wheels will be distinct from each other, thus allowing them to be worked at different rates of speed or in opposite directions, to assist in bringing the steamer alongside the wharf or to turn the ship round in little more than her own length. On a lower deck will be a double line of rails, each line being of sufficient length to receive fifteen railway-carriages and wagons, making in all a train of thirty carriages. The estimated rate of speed will be eighteen knots an hour, whereby it is hoped to perform the passage in one hour and ten minutes in fine weather, and in one hour and thirty minutes in bad. By using two steamers, and having one in reserve, the projectors would be enabled to make six passages each way daily, thus carrying 2,680 passengers and 2,640 tuns of goods per day, or 978,200 passengers and 963,600 tuns of goods a year. The cost of these steamers is estimated at about £136,000 each, or in round numbers £400,000 for the three.

To receive these steamers, it will be necessary to construct a new dock at Calais.

The projectors asked of the French Government four things:—

1. The authorization to construct a *gare-maritime* or dock at their own risk—such dock to remain their sole property in perpetuity.
2. That the bridge to connect this dock with the shore and the North of France Railway shall be made at the cost of either the French Government or the North of France Railway.
3. That the French Government will use their good offices to induce the English Government to execute the necessary works at Dover for embarking and disembarking the trains brought from the steam ferries.
4. That the French Government will enter into a mail contract for twenty years with an annual subsidy of £20,000.

The projectors hoped, if all these are granted, to obtain a similar contract and subsidy from the English Government for carrying the English mails. The projectors calculated on two years and a half to put their plans into execution, and proposed that the contract of twenty years begin to run two years and a half after the state concession shall be granted.

Stevens Institute Lectures.

It is with pleasure we call attention to the course of lectures which will be delivered at the dates specified below, in the Lecture Hall of the Stevens Institute of Technology, Hoboken, N. J.

As a consideration of the subjects enumerated will show, they are intended for the benefit of men of science and those interested in the special subjects of Mechanical and Civil Engineering, and are not expected to prove attractive to a general audience. The names of the lecturers are a sufficient announcement of the interest and value of the information which will be conveyed, and the subjects will be very fully illustrated by general and detailed drawings.

Lecture I.—By Mr. A. L. Holley, C.E., on "Bessemer Machinery." Tuesday, Feb. 6.

Lecture II.—By Mr. A. L. Holley, C.E., on "Modern Rolling-mill Machinery." Thursday, Feb. 8.

Lecture III.—By Prof. J. E. Hilgard, on "Methods of Precision in Weighing and Measuring." Friday, Feb. 16.

Lecture IV.—By Mr. Coleman Sellers, on "Transmission of Motion." Monday, Feb. 19.

Lecture V.—By Prof. R. H. Thurston, on "The History of the Steam-engine and the Direction of its Future Development." Thursday, Feb. 22.

Lecture VI.—By Prof. R. H. Thurston, on "The History of the Steam-engine and the Direction of its Future Development." Tuesday, Feb. 27.

Tickets for the course are one dollar. Single tickets, twenty-five cents at the door. We are sure that neither time nor money can be more advantageously applied than in availing one's self of the interest and information afforded by these lectures.

Amateur Safe Smashing.—A few days since a safe, the key of which was lost, was sent to an expert in Maiden Lane, New York City, to be opened. The operator, after drilling for some hours, concluded to try the effect of gunpowder. He not only opened the safe but broke the windows in three buildings and got himself arrested by the police.

Wilson's Patent Car-truck.

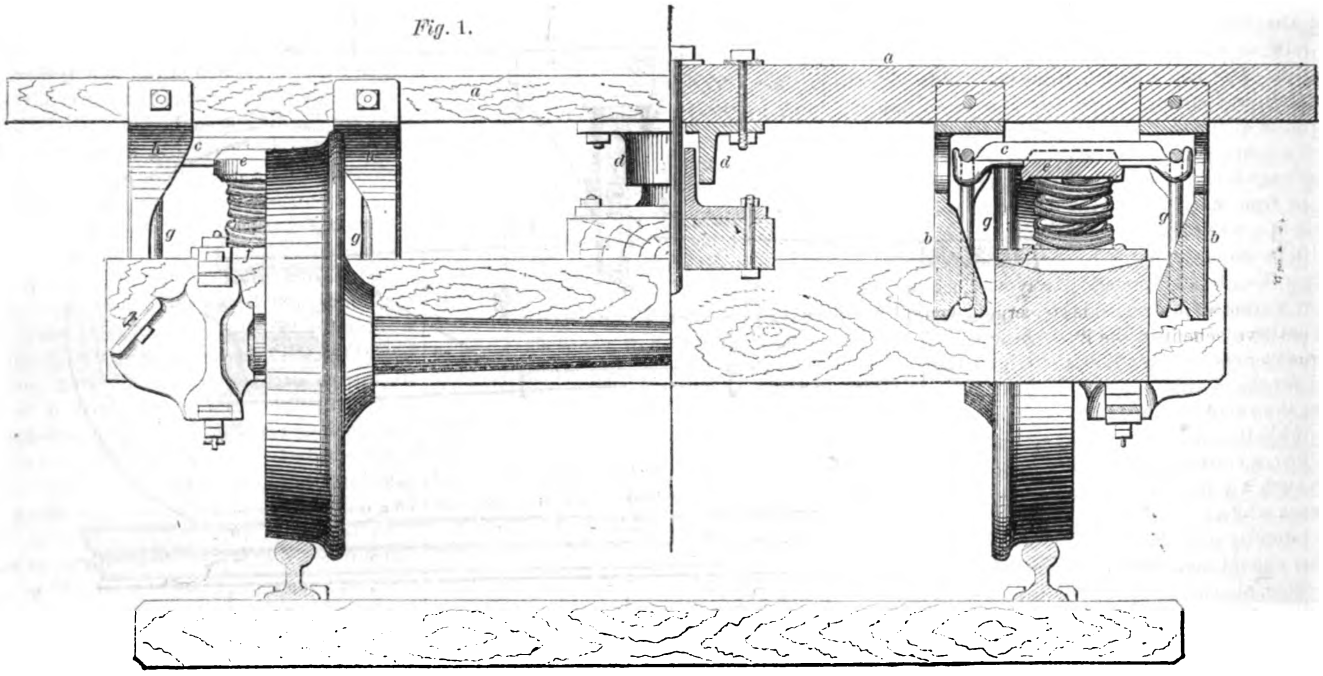
The various combinations of friction-wheels, rollers, swinging-bolsters, etc., hitherto employed to enable a car to adapt itself to the curvatures of the railway-track, have been open to manifest and serious defects. Among others, a tendency to spread the track at the curves and to pass the latter, which has frequently proved the source of no inconsiderable detriment both to rolling-stock and permanent-way. To avoid all this is the object of the invention herewith illustrated. This is an improved truck, invented by Mr. T. L. Wilson, patented Feb. 16, 1869, and now brought before the public by Messrs. McMurray, Fuller & Co., of Toronto, Canada. Fig. 1 shows an end elevation and sectional end view of the apparatus, and Fig. 2 a side elevation of the same. Aside from other advantages herein more specifically referred to further on, there will be noticed the substitution of the reverse-coil nest spiral spring in lieu of the comparatively heavy elliptic spring. The spring being placed midway between the tread of the wheel and the center of the journals, the weight of the load is thus concentrated at the proper place, instead of being carried too much inward toward the center of the axle—as is the case with all swinging-bolster trucks—and causing the bearings to wear more on the inner than on the outer ends. The elliptic spring, owing to its size, could not be so placed without interfering with the wheels; nor is it necessary to weaken the truck-frame by cutting it away to make room for the spiral spring, as was the case with the elliptic.

A crown-plate, *d*, of an oval instead of a cylindrical form, is employed to facilitate the lateral play of the bolster, *a*. The spring-link brackets, *b*, it will be seen, are so arranged as to act in conjunction with the crown-plate, and prevent the truck from diverging from the permanent-way in case of accident; the oval shape of the crown-plate, catching the bolt that acts in it, and forming a resistance simultaneously with the spring-link brackets dropping between the truck-frame timbers on *both* sides of each wheel, thus giving five distinct points of resistance, and making it impossible for the truck to swerve from the track. A radial and lateral motion is secured to the car on the axis of the truck by the swinging-links and oval crown-plate, giving the car an easy adaptation to curves without strain and unnecessary friction, and avoiding the expense of a swinging-bolster.

The general and particular advantages of this improvement will be apparent on examination to all who have a practical knowledge of what is requisite in a good car-truck, namely, simplicity of construction, economy of first cost, strength, safety, and durability. The engravings represent the truck in a loaded position for freight car. The gauge is four feet eight and a half inches. In the references, *c* is the link-carrier, *e*, the spring-cap, *f*, the spring-seat, and *g*, the carrying-link.

The truck has been adopted after trial by the Great Western Railway of Canada, and also by the Toronto and Nepissing Railway, on which a car equipped with the truck has been running regularly for the last four months with 8,500 feet of wet lumber, weighing not less than thirteen tons Weight of car, 11,000 pounds, carrying 26,000 pounds freight. On a three-foot six-inch gauge this car will carry two pounds of freight to one of dead weight. The center of gravity is eighteen inches lower than that of other trucks.

Fig. 1.



WILSON'S PATENT CAR-TRUCK.

The Rumford Medal and the Harrison Boiler.

The American Academy of Arts and Sciences has presented the "Rumford" medals to Joseph Harrison, Jr., of Philadelphia, for his "invention of safety boilers." The award of the medal was made at the last annual meeting of the Academy (1871), and the correspondence on the subject, together with a brief account of the origin of the fund, and of the previous awards of the medal, will be found in our news columns. Among the former recipients of the "Rumford medals" in America and in Europe will be found the names of Dr. Robert Hare, of Philadelphia; John B. Ericsson, and George H. Corliss, of our own country; and Sir Humphry Davy, Michael Faraday, Sir David Brewster, F. J. D. Arago, Henry Fox Talbot, Dr. Arnott, and John Tyndall, abroad. In the United States, the medals are provided for by a fund, placed by Count Rumford in charge of the American Academy of Arts and Sciences, Boston, and in Europe by a similar fund, placed in charge of the Royal Society, London.—*Exchange*.

Royal Scottish Society of Arts.

At one of the weekly meetings, recently, of this society, Dr. Stevenson Macadam, F.R.S.E., read a valuable communication on the relative photogenic value of vegetable, animal, and mineral oils, and coal gas. After giving many interesting details obtained by experimental research, Dr. Macadam said that paraffine oil and gas are cheaper than any of the other materials. Where any reasonable quantity is used, gas is decidedly the cheapest; but where extremely small jets are employed, the ordinary paraffine lamp has the advantage in respect of cost, though it requires some trouble to keep it in order. In concluding his paper, Dr. Macadam called attention to the fact that the refined paraffine oil used in lamps, and which costs 2s. per gallon, is made from crude paraffine oil costing only 4½d. or 5d. per gallon. If, he said, they could get the crude oil broken up into a permanent gas, he did not see why an illuminating agent should not be got at a very cheap rate. Mr. Miller said that in Prussia, Silesia, and other parts of the Continent he had seen gas made from the crude paraffine oil, which was said to be not only better than that made from coal, but much more economical. Mr. Reid said that something of the kind had been done in this country under Mackenzie's patent by mixing the crude oil with coal-dust. The oil had also been used alone in a retort. Great difficulty had, however, been found in getting equal results. Mr. Miller said that on the Continent the practice was to run the crude oil into the retorts, which were kept at a uniform low temperature. Dr. Macadam said there was no difficulty in getting a good gas from the oil, but the difficulty was to get a gas that would keep its quality for more than a day or two. Some further discussion took place, and a vote of thanks was accorded to Dr. Macadam for his paper.

Growth of New York City.—The annual report of the Superintendent of Buildings in New York, for the year 1871, has just been issued. During the past year, 4,180 new buildings were commenced, and 3,624 completed.

The Coloring of Veneers.

Some manufacturers of Germany, who had been supplied from Paris with veneers, colored throughout their mass, were necessitated by the late war to produce them themselves. Experiments made in this direction gave in the beginning colors fixed only on the outside, while the inside was untouched, until the veneers were soaked for twenty-four hours in a solution of caustic soda, containing ten per cent. of soda, and boiled therein for half an hour; after washing them with sufficient water, to remove the alkali, they may be dyed throughout their mass. This treatment with soda effects a general disintegration of the wood, whereby it becomes in the moist state elastic and leather-like, and ready to absorb the color; it must then, after dyeing, be dried between sheets of paper, and subjected to pressure to retain its shape. Veneers treated in this way, and left for twenty-four hours in a hot decoction of log-wood (one part of log-wood to three of decoction), removing them after the lapse of that time, and, after drying them superficially, putting them into a hot solution of copperas (one part of copperas to thirty of water), will, after twenty-four hours, become beautifully and completely dyed black.

A solution of one part of picric acid in sixty of water, with the addition of so much ammonia as to become perceptible to the nose, dyes the veneers yellow, which color is not in the least affected by subsequent varnishing. Coralline dissolved in hot water, to which a little caustic soda and one-fifth of its volume of soluble glass has been added, produces rose colors of different shades, dependent on the amount of coralline taken. The only color which veneers will take up, without previous treatment of soda, is silver gray, produced by soaking them for a day in a solution of copperas (one of copperas to one hundred of water).—*Exchange.*

Future of Corn Harvesting.

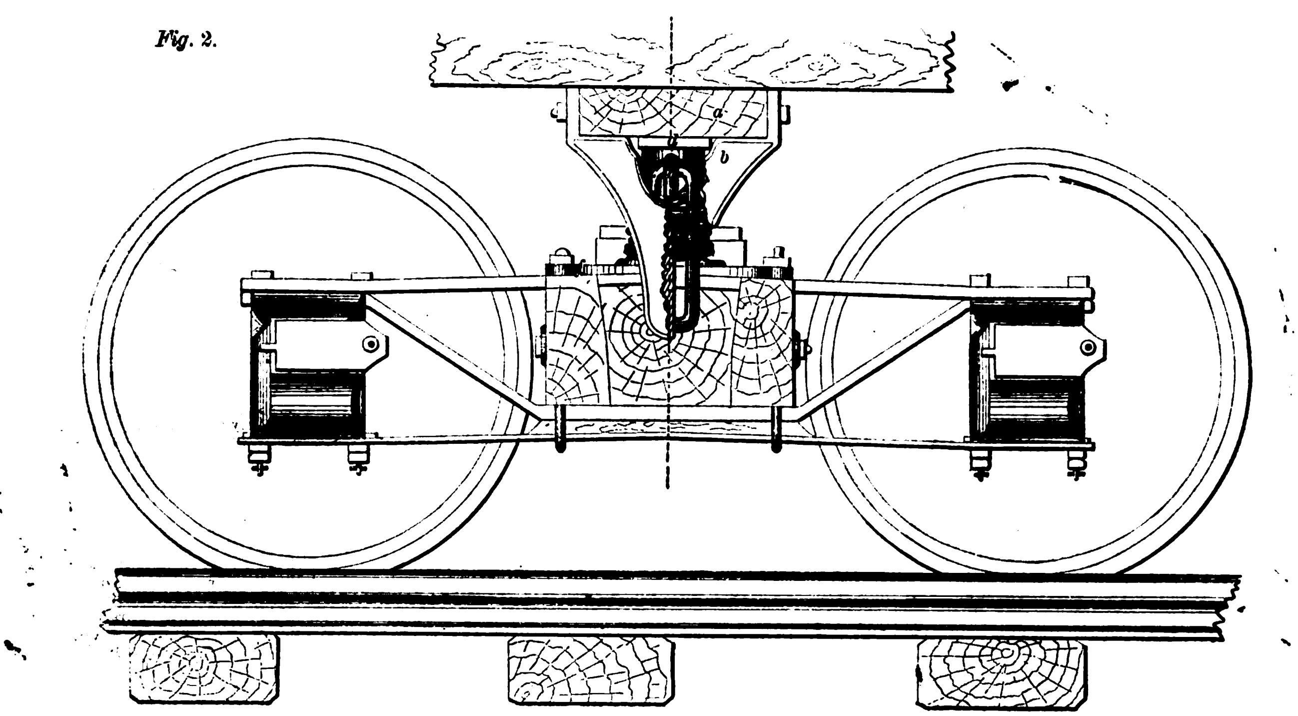
A writer in the *Agriculturist* says:—"I believe corn will yet be harvested as we harvest wheat—cut with a reaper, bound into bundles of a convenient size for pitching, and then thrashed or husked by a big machine, driven by ten horses or a steam-engine. It must be powerful enough to take in a bundle at a time, strip off the ears and husk them, and the stalks, as they pass through, can be cut up and elevated by a straw-carrier. I believe in less than ten years we shall see hundreds of such machines travelling from farm to farm as thrashing-machines now do, and we shall wonder how we ever got along without them."

The Northern Pacific Railroad.

This company has just closed a contract with the Baldwin Locomotive Works for fifty first-class locomotives, which will be added to 48 already purchased, principally from the same works. This road has also purchased 50,000 tuns of railroad iron from Pennsylvania manufacturers, besides an immense quantity of spikes, frogs, switches, cars, chains, etc., the outlay for which, in Philadelphia and Pennsylvania alone, during the last eighteen months, has been upward of $5,000,000. As the road goes on, even more in proportion than this immense sum will be expended in this State, showing that the originator and promoter of this enterprise, Jay Cooke, believes in patronizing home industry. The road is now completed to Morehead, a point 260 miles west of Duluth, and goes ahead rapidly, the cash capital being well apace with its construction, as the bond sales for December alone were upward of $1,000,000.

One hears of so many contracts with the Baldwin Works now that it is difficult to foresee how the work is to be done. With Russia the firm has orders for 500 first-class engines, 50 for the North Pacific, large South America orders, and no end of little jobs of equipping new roads at home. It is a curious fact that, when competing with English works for locomotives, this establishment can "discount" them $1,000 on an engine, notwithstanding the higher price of American iron and labor, showing that the manufacturers abroad make money, if the men do not. The great demand upon these works will soon require an extension of facilities, for with such orders one locomotive turned out daily will not supply the trade.—*Iron Age.*

Fig. 2.



WILSON'S PATENT CAR-TRUCK.

OFFICIAL LIST OF PATENTS

ISSUED FROM THE UNITED STATES PATENT OFFICE

For the Week ending January 16, 1872,

AND EACH BEARING THAT DATE.

[*Reported officially for the "American Artisan."*]

PATENT CLAIMS, DRAWINGS, AND SPECIFICATIONS.—*Owing to the constantly increasing number of patents issued, we have—as we must have done sooner or later—ceased to publish the Claims, and instead thereof we publish the names of the patentees, with the titles of their inventions, with descriptions on another page of some of the more important inventions; but we are prepared to furnish immediately on application, or by return mail, when requested by letter, a copy of the claims of any existing patent, for - 75 cents.*
We also furnish a printed copy of the whole specification of any patent issued since November 20, 1866, for - - $1 25
We will also supply a sketch of the parts claimed in any patent, or a full copy of the drawing thereof, at charges varying from $1 upwards.

ADVICE TO INVENTORS AND PATENTEES.

Whenever asked, we will promptly send, gratis, our recently published pamphlet, entitled "IMPORTANT INFORMATION FOR INVENTORS AND PATENTEES," *containing details of the proceedings necessary to be taken by inventors desirous of obtaining Letters-Patent in the United States. Also, Instructions to Patentees concerning Re-issues, Extensions, Infringements, Foreign Patents, etc.*

Address BROWN, COOMBS & Co., *Solicitors of American and Foreign Patents, 189 Broadway, New York.*

122,693.—WALL-PROTECTOR FOR WASH-STANDS.—Frank Allen, Chicago, Ill.

122,694.—ENVELOPE AND LETTER-SHEET COMBINED.—Josiah Burnham Anderson, Wakefield, Mass.

122,695.—SEWING-MACHINE.—James T. Baggs, Bridgeport, Ohio.

122,696.—SAD IRON HANDLE.—Samuel R. Bartlett, Burlington, Iowa.

122,697.—BEE-HIVE.—Christian Beard, Waynesborough, Va.

122,698.—BED-BOTTOM.—Harmon Benedict, Philadelphia, Pa.

122,699.—THILL-COUPLING.—Thomas R. Bevans and Cornelius Barkenbus, Kalamazoo, Mich.

122,700.—PRESSURE-GAUGE.—Jefferson Brown, Jun., New York City. Ante-dated Jan. 10, 1872.

122,701.—DRIP GUARD FOR BRUSHES.—William Buck, Portsmouth, assignor to himself and William W. Urquhart, Bay City, Mich.

122,702.—MACHINE FOR CUTTING THREADS ON BOLTS.—Orville C. Burton, assignor to himself and Charles H. Graham, Unionville, Conn.

122,703.—WEATHER STRIP.—Hermann Bussmann, Syracuse, N. Y.

122,704.—SAFETY-VALVE.—Hiram P. Case and Robert P. Baillie, Detroit, Mich.

122,705.—SPINDLE-BEARING FOR SPINNING MACHINES.—Linneus Cheetham, Lewiston, Me.

122,706.—MACHINE FOR UPSETTING BOLT BLANKS.—James B. Clark, Plantsville, Conn. Ante-dated Jan. 8, 1872.

122,707.—TOY FOR PRODUCING A CRYING SOUND.—Robert J. Clay, assignor to himself and Tasker H. Marvin, New York City.

122,708.—PEN AND PENCIL-CASE.—John Cockburn, New York City.

122,709.—IRON BUILDING.—John M. Cornell, New York City.

122,710.—STEAM HEATING APPARATUS COMBINED WITH A RANGE.—Edward Mortimer Decy, New York City.

122,711.—HARROW.—Samuel Donaldson, Fenton, Mich.

122,712.—ATTACHMENT FOR HOISTING-GEARS.—George Duerre, Williamsburg, N. Y.

122,713.—ROTARY ENGINE.—James Beard Faucett, Pope's Station, Miss.

122,714.—MACHINE FOR MAKING BRICKS AND ARTIFICIAL STONES.—John Fenson, Toronto, Canada.

122,715.—PITMAN ROD CONNECTION.—Edward G. Fish, Colfax, Iowa.

122,716.—ALLOY FOR LINING WATER COOLERS, TANKS, ETC.—Zebina E. Fobes, Troy, N. Y., assignor to himself and Henry Patchin, Bennington, Vt.

122,717.—BREECH-LOADING FIRE-ARM.—Austin T. Freeman, Herkimer, assignor to E. Remington & Sons, Ilion, N. Y.

122,718.—NOZZLE FOR SODA-FOUNTAINS.—William Gee, New York City.

122,719.—ELASTIC NOZZLE FOR HOSE.—John Greacen, Jun., New York City. Ante-dated Dec. 29, 1871.

122,720.—RADIATOR.—John Gross, Ridgeville, Canada.

122,721.—DROP-LIGHT GASALIER.—John Horton, New York City.

122,722.—OSCILLATING LIFTING-PUMP.—Edwin Horsey, Kingston, Canada, assignor to Anthony Sluthour, Cleveland, Ohio.

122,723.—AGRICULTURAL BOILER.—Peter H. Inman and Charles B. Withington, Janesville, Wis.

122,724.—THILL-COUPLING.—Benjamin W. Jager, Hainesville, N. J.

122,725.—EASEL.—Nathaniel Johnson, New York City.

122,726.—THRASHING MACHINE.—Jacob S. Keller, and Isaac L. Stoner, Ephrata Township, Pa.

122,727.—EARTH-CLOSET.—Benjamin Lundy Kent, West Chester, Pa.

122,728.—CONSTRUCTION OF SIEVES.—Robert J. Mann, Burlington, Iowa.

122,729.—GRAIN-DRILL.—Daniel E. McSherry, Dayton, Ohio.

122,730.—SEAT FOR CHURCHES, ETC.—Charles O. Mealia, Brooklyn, N. Y. Ante-dated Dec. 30, 1871.

122,731.—PUDDLING FURNACE.—David Morgan, assignor of one-half his right to William M. Speer, Pittsburg, Pa.

122,732.—WATER-WHEEL.—John Mullica and Benjamin Mullica, Jun., assignor of one-third their right to Robert A. Hennessey, Waterford Works, N. J.

122,733.—GAS APPARATUS.—George Olney, Brooklyn, N. Y.

122,734.—LAMP FOR RAILWAY CARS.—William H. Paige, assignor to himself and John I. Moore, Springfield, Mass.

122,735.—WRINGING AND MANGLING MACHINE.—Ara Paine, Burrillville, R. I.

122,736.—SEED-PLANTER.—James A. Preston, Greensborough, Ga.

122,737.—CHILD'S CRADLE.—John L. Riter, Brownsville, Ind.

122,738.—RACK FOR WATER-WHEEL FLUMES.—George W. Russell, Lawrence, Mass.

122,739.—GATE FOR TURBINE WATER-WHEELS.—George W. Russell and Charles J. Bradbury, Lawrence, Mass.

122,740.—CORN-SHELLER.—Hugh Sells, Vienna, Canada.

122,741.—CHAMBER-VESSEL.—John Sullivan, Thornton, Canada.

122,742.—HUB FOR VEHICLE-WHEELS.—Hiram Taylor, Milton, Alfred P. Taylor, Mineral Ridge, and Cyrus Palm, Jackson, Ohio.

122,743.—SASH-HOLDER.—Aaron Thomas, Milton, Ill.

122,744.—TYPE-DISTRIBUTING MACHINE.—David B. Thompson, Brooklyn, N. Y.

122,745.—LOOM STOP-MOTION AND SHUTTLE.—William W. Tucker, Hartford, Conn.

122,746.—HEATING-STOVE.—Samuel S. Utter, Brooklyn, N. Y.

122,747.—SEWING-MACHINE.—Ausbert H. Wagner, Chicago, Ill.

122,748.—PULVERIZING AND GRINDING MACHINE.—Jerome Josiah Webster, Magog, Canada.

122,749.—CORN-SHELLER.—David G. Wells, Joliet, Ill.

122,750.—HARVESTER.—John H. Whitney, Rochester, Minn.

122,751.—WASHING MACHINE.—Squire Ainsworth, Pittsburg, Pa.

122,752.—COTTON-PRESS.—William W. Anderson, Wartrace, Tenn.

122,753.—PRUNING-SHEARS.—Samuel J. Beigh and Eli F. Beard, Republic, Ohio.

122,754.—MARBLE-DRESSING AND CARVING MACHINE.—Greene V. Black, Jacksonville, Ill.

122,755.—PAINT FROM MAGNESITE.—John Briggs, Boston, Mass.

122,756.—SAFETY-VALVE.—William Camerer, Reading, Pa.

122,757.—COLORING GRAIN AND SEEDS FOR SOWING.—John C. H. Claussen, Charleston, S. C.

122,758.—BUTTER-CARRIER.—Joshua B. Crozier, Cumberland, Ohio.

122,759.—LIQUID-METER.—Theodore A. Curtis, Springfield, Mass., assignor to himself and J. S. Curtis, Hartford, Conn.

122,760.—THILL-COUPLING.—Lyman Derby, Franconia, N. H.

122,761.—NUT-LOCK.—Edwin H. Dooley, New York City.

122,762.—EXTINGUISHER FOR STREET LAMPS.—George S. Dunbar, Pittsfield, Mass.

122,763.—COMPOSITION FOR COVERING BLACKBOARDS, ETC.—Nathan V. Evans, assignor to himself and Joel B. Evans, Winslow, Ind.

122,764.—GATE.—Allen Gaskill, Neoga, Ill.

122,765.—HARROW.—Columbus Hairgrove, Jacksonville, Ill.

122,766.—GAUGE-COCK.—L. T. Hulbert, Painesville, Ohio.

122,767.—LAMP-EXTENSION SUPPORTER.—Liverus Hull, Charlestown, Mass.

122,768.—WATCH-MAKER'S LATHE.—Gasper Hunziker, Summit, Miss.

122,769.—METAL TURNING-LATHE.—William Kitson, Lowell, Mass.

122,770.—CORN-PLANTER.—John L. Kreider, Chestnut Level, Pa.

122,771.—DECORATIVE OIL-PAINTING.—Jean Marie Lasché, Paris, France.

122,772.—BREECH-LOADING FIREARM.—James Lee, Milwaukee, Wis.

122,773.—PROCESS FOR MANUFACTURING FERTILIZERS.—James Alexander Manning, London, England. Ante-dated Dec. 30, 1871.

122,774.—PANEL-RAISING MACHINE.—John H. Millspaugh, assignor to Millspaugh, Rowley & Millspaugh, Williamsport, Pa.

122,775.—FIRE-PLACE.—Miles Moore, Bartlett, Tenn.

122,776.—SASH-HOLDER.—Oscar W. Noble, Darlington, Wis.

122,777.—ORGAN-ACTION.—John H. Odell, New York City.

122,778.—TIRE-SETTER.—Joseph Pallca, Ledyard, N. Y.

122,779.—TOP-ROLLER FOR SPINNING MACHINES.—Stephen S. Potter, Cranston, R. I.

122,780.—MACHINE FOR EDGING BOARDS.—Simon H. Richardson, Bangor, Maine.

122,781.—SAW-MILL.—Simon H. Richardson, Bangor, Maine.

122,782.—GRAIN-SCOURING MACHINE.—W. Pitt Robinson, Buffalo, N. Y.

122,783.—PAPER-STOCK BLEACH.—Jacob W. Rossman, Stockport, N. Y.

122,784.—EARTH CLOSET.—Hamilton Sherman, Waverly, Pa.

122,785.—PHOTOGRAPHIC CAMERA.—John Stock and Jacob Stock, New York City.

122,786.—SELF-ACTING MULE FOR SPINNING.—Joseph P. Sweet, Hebronville, Mass.

122,787.—WRENCH.—George C. Taft, Worcester, Mass.

122,788.—BOOT AND SHOE.—George W. Tash, Dover, N. H.

122,789.—ROTARY STEAM-ENGINE.—Thomas V. Van Pelt, Spring Hill, Kan.

122,790.—TRAVERSE MOTION.—Duncan Walker, East Hampton, Mass.

122,791.—ELEVATOR.—James D. Warner, Brooklyn, N. Y.

122,792.—WASHING MACHINE.—Isaac J. Wells, Spring Valley, N. Y.

122,793.—AIR-SUPPLYING ATTACHMENT FOR STOVES.—Wesley Wright, Lee's Summit, Mo.

122,794.—COMBINED LATCH AND LOCK.—James Adair, Pittsburg, Pa.

122,795.—LOOM-HEDDLE.—John Ashworth, Andover, Mass.

122,796.—METALLIC BARREL.—James I. Bard, New Orleans, La.

122,797.—FIREPROOF COLUMN.—William A. Berkey, Grand Rapids, Mich.

122,798.—SPRING BED-BOTTOM.—Charles Bigeon, Cincinnati, Ohio.

122,799.—REFRIGERATING CUPBOARD.—John M. Blaisdell, Sanbornton, N. H.

122,800.—EXTENSION-TABLE.—John M. Blaisdell, Sanbornton, N. H.

122,801.—HARVESTER-CUTTER.—John A. Bonham and Alvah J. Harrington, Lovely Dale, Ind.

122,802.—MOTIVE-POWER.—Adolph Bouchard, New Orleans, La.

122,803.—GRAIN-BINDER.—Charles W. Bowron, Chicago, Ill. Ante-dated Jan. 1, 1872.

122,804.—MOP-WRINGER.—Edward E. Brewster, Holly, Mich.

122,805.—IRON SHUTTER-BLINDS.—William E. Brock, New York City.

122,806.—METAL-SLAT FOR SHUTTER-BLINDS.—William E. Brock, New York City.

122,807.—TIE-ROD FOR SHUTTER-BLINDS.—William E. Brock, New York City.

122,808.—TASSEL FOR MUFFS.—Samuel Brody, New York City.

122,809.—WATER-WHEEL.—Aaron H. Brubaker, Brunersville, Pa.

122,810.—DISTILLING AND BLEACHING OILS.—Charles J. T. Burcey, Black Rock, Conn.

122,811.—GRINDING-MILL.—Jabez Burns, New York City.

122,812.—HEATING-STOVE.—Ferdinand E. Chatard, Jun., Baltimore, Md.

122,813.—BALE-TIE AND STRAINING-LEVER.—James C. Colt, Cheraw, S. C.

122,814.—HAND-CAR.—Jairus Collins, assignor to himself and John D. Saltsgaves, Fairview, Ohio.

122,815.—MACHINE FOR STRAIGHTENING FINGER-BARS.—Joseph Corns, Akron, Ohio.

122,816.—MACHINE FOR STRIPPING AND BOOKING TOBACCO.—Otis Dean, assignor of two-thirds his right to Philip Whitlock, Richmond, Va.

122,817.—STAMPING PRESS.—John Wesley Dodge, Malden, assignor to himself, Charles E. Woodman, and William Butterfield, Boston, Mass.

122,818.—FRICTION-PULLEY.—William Ebbitt, New York City.

122,819.—HEMMER FOR SEWING-MACHINES.—John V. D. Eldredge, Detroit, Mich., assignor to Charles A. Shaw, Biddeford, Maine, and Henry W. Boardman, Lowell, Mass.

122,820.—SPRING RUNNING-GEAR FOR WAGONS.—John Faussett, Leonardtown, Md.

122,821.—ICE-PRESERVING JAR.—William L. Faxon, Quincy, Mass.

122,822.—FRICTION-CLUTCH.—Peter Ferguson, New Haven, Conn., and Francis G. Bates, Springfield, Mass.

122,823.—PROPELLER.—Ross Forward, Cincinnati, Ohio.

122,824.—MANUFACTURING FLAT ORNAMENTAL CHAINS.—Joseph J. Freeman, assignor to Freeman & Co, Attleborough, Mass.

122,825.—PUMP-PISTON.—Paul Giffard, Paris, France.

122,826.—CURTAIN-FIXTURE.—Albert J. Goodrich, assignor to Turner, Seymour & Judds, Wolcottville, Conn.

122,827.—GRIST-MILL.—Edward Harrison, New Haven, Conn.

122,828.—MACHINE FOR PLANING BARREL-HEADS.—George R. Hay, Cleveland, Ohio.

122,829.—AXLE-BOX.—John T. Henry, New Haven, Conn.

122,830.—TABLE FOR GAMES.—Henry R. Heyl, Philadelphia, Pa. Ante-dated December 30, 1871.

122,831.—WINDLASS FOR VESSELS.—Oliver P. Hix, Rockland, Me.

122,832.—MACHINE FOR BREAKING STONES, ETC.—Arthur Hope, Prahan, Colony of Victoria, assignor to himself and Hugh Junor Browne, Melbourne, Australia.

122,833.—PROP FOR BUGGY-TOPS.—Anthony Huff and Andrew J. Mitchell, Louisville, Ky.

122,834.—FOLDING-CHAIR.—Theodore Johnson, Portland, Me., assignor to Joseph H. Travis and Eugene H. Mahoney.

122,835.—WAGON-HUB.—Thomas M. Jones and Charles W. Fillmore, Chicago, Ill.

122,836.—MATCH-BOX.—Albert D. Judd, New Haven, Conn.

122,837.—MACHINE FOR RIVETING HINGES.—Edward H. Lacy and Platt Lyon, assignors to Roy & Co., West Troy, N. Y.

122,838.—THILL-COUPLING.—Lars P. Larson, Yonkers, N. Y.

122,839.—ELEVATOR.—William Livingstone and William F. Holske, Brooklyn, assignors to William F. Holske and William H. Silberhorn, New York City.

122,840.—FASTENING FOR SATCHELS.—Philip P. Lynch, Newark, N. J., assignor to himself and John M. Riley. Ante-dated December 23, 1871.

122,841.—LOCOMOTIVE-BOILER FURNACE.—Philip W. Mackenzie, Blauveltville, N. Y.

122,842.—FEED-GAUGE FOR PRINTING-PRESSES.—Edward N. Maxwell, Louisville, Ky.

122,843.—WINDING APPARATUS FOR OYSTER-DREDGES.—Thomas Ferguson Mayhew, Port Morris, N. J. Ante-dated, January 1, 1872.

122,844.—PAPER-CUTTING MACHINE.—Charles W. L. Montague, Brooklyn, N. Y., assignor to Cyril C. Child, Boston, Mass.

122,845.—LOCK-NUT.—Almon T. Morris, Nevada, Ohio.

122,846.—HOISTING Apparatus.—Charles R. Otis and Norton P. Otis, Yonkers, N. Y.

122,847.—GAUGE-COCK FOR STEAM-BOILERS.—William Painter, assignor of one-half his right to Lewis R. Keizer, Baltimore, Md.

122,848.—TRACTION-ENGINE.—Robert Crouch Parvin, Philadelphia, Pa.

122,849.—TRACTION-ENGINE.—Robert C. Parvin, Philadelphia, Pa.

122,850.—LAND-CARRIAGE.—Robert Crouch Parvin, Philadelphia, Pa.

122,851.—BRICK MACHINE.—James W. Penfield, Willoughby, Ohio.

122,852.—CLIPPING SHEARS.—Joseph K. Priest and Roswell T. Smith, assignors to themselves, William Earl, and James G. Blunt, Nashua, N. H.

122,853.—DRAUGHT-REGULATOR FOR PLOWS.—Martin Prillaman, Tipton, Ind. Ante-dated January 8, 1872.

122,854.—CIGAR-BOX.—William R. Rhoades, Auburn, N. Y.

122,855.—DISH-RACK.—J. Max Rudiger, Brooklyn, N. Y.

122,856.—PEANUT SHELLER.—Joseph W. Sands and Benjamin F. Walters, Norfolk, Va.

122,857.—Not issued.

122,858.—METHOD OF CONDUCTING THREAD OVER THE GUIDE-WIRE OF BOBBIN-WINDERS FOR SEWING-MACHINES.—George G. Sheldon, assignor to himself and Nelson C. Gridley, Chicago, Ill.

122,859.—TRUSS.—Jacob A. Sherman, New York City.

122,860.—MACHINE FOR PUNCHING AND SHEARING METAL.—Edward A. Sloat, Stone Mill, N. Y.

122,861.—COMBINED CULTIVATOR AND PLANTER.—Emanuel Spangler, York, Pa.

122,862.—WIRE-FENCE.—Thomas H. Speakman, Philadelphia, Pa.

122,863.—BASE-BURNING FIRE-PLACE HEATER.—James Spear, Philadelphia, Pa.

122,864.—LAMP.—William Staehlen, Williamsburgh, assignor to Charles F. A. Hinrichs, Brooklyn, N. Y.

122,865.—TRUNK-LOCK.—Joseph Stanton, assignor to Adolphus Hagelin, New York City.

122,866.—DRAIN-TRAP.—J. Christian Immanuel Sturm, Buffalo, N. Y.

122,867.—INK-ERASER.—James W. Tallmadge, New York City.

122,868.—IMITATION HAIR-CLOTH.—Isaac N. Tichenor, Newark, N. J.

122,869.—VULCANIZED RUBBER RING FOR BOOT AND SHOE HEELS.—William H. Towers, Boston, Mass.

122,870.—CHURN.—John Vanatter, Stratford, Canada.

122,871.—COOKING-STOVE.—Nicholas S. Vedder, Troy, N. Y.

122,872.—SEWING-MACHINE TABLE.—Ausbert H. Wagner, Chicago, Ill.

122,873.—HOSE-COUPLING.—Thomas W. Welsh, assignor to the Westinghouse Air-brake Company, Pittsburg, Pa.

122,874.—CANAL-BOAT.—Horace Wickham, Jun., assignor to Henry P. Caldwell and Hugo Wangeman, Chicago, Ill.

122,875.—TOY.—Charles Wigger, Cincinnati, Ohio.

122,876.—MACHINE FOR FINISHING HORSESHOE-NAILS.—Harry A. Wills, assignor to Julia A. Wills, Vergennes, and Lucy S. Kingsland, Burlington, Vt.

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RE-ISSUES.

4,710.—HARVESTER.—Div. A.—Thomas Berry, Louisburg, Ky., assignor to John F. Seiberling, Akron, Ohio. Patent No. 20,618, dated June 22, 1858.

4,711.—HARVESTER.—Div. B.—Thomas Berry, Louisburg, Ky., assignor to John F. Seiberling, Akron, Ohio. Patent No. 20,618, dated June 22, 1858.

4,712.—COOLING AND DRYING MEAL.—John Deuchfield, Syracuse, N. Y. Patent No. 19,984, dated April 20, 1858.

4,713.—SPRING BED-BOTTOM.—Elisha E. Everitt, assignor to Henry F. Hover, Philadelphia, Pa. Patent No. 69,198, dated September 24, 1867.

4,714.—PREPARING FISH FOR FOOD.—George H. Heron, assignor, by mesne-assignments, to Edwin T. Fowler, Washington, D. C. Patent No. 70,435, dated Nov. 5, 1867.

4,715.—PAINT-MILL.—John W. Masury, New York City.—Patent No. 107,939, dated Oct. 4, 1870.

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DESIGNS.

5,472.—CARPET-PATTERN.—Jonathan Crabtree, assignor to John Gay, Philadelphia, Pa.

5,473.—TABLE.—William H. Groff, Lawrenceburg, Ind.

5,474.—BORDER FOR KNIT FABRICS.—Thomas Langham, assignor to Thomas Dolan, Philadelphia, Pa.

5,745 and 5,746.—FIGURE FOR LAMP-BASE.—David Mosman, assignor to Bradley & Hubbard, West Meriden, Conn.

5,477.—TYPE.—Richard Smith, assignor to Mackellar, Smiths & Jordan, Philadelphia, Pa.

5,478.—ORNAMENTATION OF BUCKLES.—James O. West, New York City.

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TRADE-MARKS.

632.—PAINT.—Nathan L. Dearborn, Dover, N. H.

633.—PRESERVED FISH.—Israel C. Mayo, Gloucester, Mass.

634.—PREPARED PLASTERING-PAPER.—The Rock River Paper Company, Beloit, Wis.

635.—HARROW.—J. J. Thomas & Co., Geneva, N. Y.

APPLICATIONS FOR EXTENSIONS.

OPPONENTS of extensions must file *written* objections in the Patent Office at least 20 days before the day-of-hearing; and on the Patent Office, and state the reasons of their opposition. All testimony—*pro* or *con*—must be taken and transmitted in accordance with the official rules, which will be furnished on application. The under-named patentees have recently petitioned for extensions (for seven years) of patents granted to them in the year 1858:—

EDMUND BIGELOW, Springfield, Mass.—*Apparatus for supplying and measuring Sirups in Soda-water.*—Patented April 6, 1858; re-issued May 4, 1868; and again re-issued Dec. 4, 1866; testimony will close on March 5, next; last day for filing arguments and examiner's report, March 15; day-of-hearing, March 20.

ELIHU BLISS, Newark, N. J.—*Watch-case.*—Patented April 13, 1858; re-issued Nov. 23, 1858; testimony will close on March 12, next; last day for filing arguments and the examiner's report, March 22; day-of-hearing, March 27.

SARAH W. VERY, administratrix of SAMUEL VERY, JUN., deceased, West Roxbury, Mass.—*Working Ship's Lower Sails in Courses.*—Patented May 11, 1858; testimony will close on April 9, next; last day for filing arguments and examiner's report, April 19; day-of-hearing, April 24.

GEORGE W. MORSE, Greenville, S. C.—*Cartridge-case.*—Patented May 11, 1858; testimony will close on April 9, next; last day for filing arguments and examiner's report, April 19; day-of-hearing, April 24.

GEORGE W. MORSE, Greenville, S. C.—*Breech-loading Fire-arm.*—Patented June 8, 1858; testimony will close on May 7, next; last day for filing arguments and examiner's report, May 17; day-of-hearing, May 22.

GEORGE W. MORSE, Greenville, S. C.—*Cartridge.*—Patented June 29, 1858; testimony will close on May 28, next; last day for filing arguments and examiner's report, June 7; day-of-hearing, June 12.

ENGLISH PATENT JOURNAL.

LIST OF APPLICATIONS FOR PATENTS

ON WHICH

Provisional Protections

HAVE BEEN OBTAINED IN ENGLAND BY OR FOR AMERICAN INVENTORS.

[*This list is condensed weekly from the "Journal of the British Commissioners of Patents," expressly for the* "AMERICAN ARTISAN."]

3,265.—FASTENINGS FOR STAIR-RODS AND OTHER OBJECTS.—H. C. Marston and J. W. Brooks, New York City.—Dec. 2, 1871.

3,295.—DOMESTIC FIRE-ESCAPE.—George D. McCullen, New Orleans, La.—Dec. 6, 1871.

3,313.—INTERLACED WIRE-WORK FOR CHAIR-SEATS, BED-BOTTOMS, ETC.—Samuel Colt, Hartford, Conn.—Dec. 7, 1871.

3,346.—PREPARATION OF GRAIN FOR GRINDING INTO FLOUR, AND IN APPARATUS THEREFOR.—L. S. and C. F. Chichester, Brooklyn, N. Y.—Dec. 11, 1871.

3,366.—GALVANIC BATTERIES.—James Smith, New York City.—Dec. 12, 1871.

3,379.—IMPROVEMENTS IN THE GENERATION OF INFLAMMABLE GASES FROM COAL, WOOD, PEAT, ETC.—William Elmer, New York City.—Dec. 13, 1871.

3,375.—CENTRIFUGAL MACHINE.—Samuel S. Hepworth, New York City.—Dec. 13, 1871.

Export of Furniture from New York.

DURING the week ending January 2, 1872, there were exported from New York, one case of veneers to Hamburg; seven packages of furniture to London; one hundred and ten cases of cabinet-work to Glasgow; one hundred and three cases of furniture to British Australia; two cases of feathers and thirty-five maple logs to Havre; three packages of furniture to the West Indies; four cases of oil-cloth and four cases of furniture to Cuba; fifty-seven packages of furniture to Hayti; seven packages of furniture to Mexico; one hundred and thirty-eight packages of furniture to New Granada; twelve hundred and three packages of furniture to the Cisplatine Republic; and three hundred and fifty-five cases of furniture to the Argentine Republic.—*Cabinet-Maker.*

German Prizes for Improvements.

THE "Verein zur Befoerderung des Gewerbofleisses" offers several prizes for a durable plaster on brick walls; for a method to determine the valuable constituents in aniline oil; for an opaque red enamel on gold, silver, and copper; for a method to make lenses for optical purposes without grinding or polishing; for a treatise on the composition of cements; for a treatise on the manufacture, formation, and constitution of coralline (aurine, pronine, rosalic acid) for the preparation of a soft yellow solder.—*Dingler's Poly. Journal.*

Nickel Plating.

A COMMUNICATION from the technical laboratory of the Bohemian Polytechnic School in Prague mentions a method of nickel plating by boiling. Wrought-iron, cast-iron, steel, copper, brass, zinc, and lead can be coated with nickel by putting them into a boiling neutral solution of chloride of zinc containing some salt of nickel, together with a little zinc dust and pieces of sheet-zinc. If the zinc solution be acid, the coating is dull. By taking cobalt solution instead of nickel, a coating of cobalt may be produced.

SPONGES.—The sponges of commerce are mostly obtained from the Mediterranean and the Bahamas. At the port of Nassau about 30,000 pounds are gathered annually. The French and Austrian Governments have begun to raise the sponge artificially, and the experiment has been pronounced not only successful, but very profitable.

Letter Box

D. J., OF N. Y.—In a water-pressure engine there must be a fall of two feet for every pound pressure per square inch. To estimate the power, multiply together the pressure in pounds per square inch, the area of the piston in inches, the length of the stroke in feet, and twice the number of revolutions per minute, and divide by 33,000. That will make the power of the engine referred to, estimating the pressure at sixty pounds per square inch, and making no deduction for friction of its parts, as nearly nine and a half horse-power. We have no data as to the friction of such engines, but should estimate it as equivalent to about four pounds per square inch of piston, which would reduce the power of this engine nearly seven per cent.

C. O. E., OF N. Y.—Your arrangement of canal-boat propeller is new to us; but so far as we are enabled by your sketch and description to understand it, we cannot regard it as very practicable. We should like a fuller explanation of it.

B. F. G., OF N. Y.—The Canadian patent obtained in the way you describe has no validity whatever. Your invention is public property in Canada. We know of nothing that you could do in the matter to benefit yourself in any way.

T. H. C., OF N. Y.—We have no further information on the subject than is contained in the article you refer to, which was duly credited to the *Iron Age*. As we understand it, iron is discolored by chemicals left in refined petroleums from the purifying processes. Any paint which will protect iron from these will be an important invention. There appears to be a decided obstacle to the invention of such a paint in this, that for several uses it must be capable of resisting both acids and alkalies, oil-of-vitriol and potash.

TYRO, OF VT.—We should suppose that the roasting of ore in heaps would be a very wasteful one in the matter of fuel. The heap is made of alternate layers of fuel and of ore as it comes from the mine. That next the ground is of wood cross-piled to insure a proper circulation of air. Above, coal may be used. In bulk, the fuel varies from one-eighteenth to one-sixth of that of the ore. Vertical openings are provided in the top to kindle the mass, but are closed when it is well started. Very commonly a number of weeks are required to burn a heap.

STUDENT, OF N. Y.—The method of determining the percentage of bisulphide of carbon existing as an impurity in illuminating gas is to burn the gas, which converts the sulphide into sulphurous acid. This is collected as sulphite of ammonia, by passing the gases from the flame through dilute ammonia. This oxydized by iodine, in a solution of iodide of potassium, produces sulphuric acid, which, by the use of chloride of barium, is precipitated as sulphate of baryta. The quantity of bisulphide required to produce in this way a given quantity of sulphate of barium, the quantity of bisulphide in the gas tested is readily arrived at.

G. G., OF MAINE.—In tarring your rope-yarn, keep the tar at a temperature of from 215° to 225°, in order to expel the moisture. Draw the yarns through the bath at a speed of about fifteen feet per minute. After tarring, the yarns must be left for some days, to allow the tar to harden on the fibers before being made into rope.

E. F., OF GA.—We believe the largest dry-dock in the United States is in the Brooklyn Navy Yard. It admits vessels of the largest size, and the water—about 610,000 cubic feet—can be pumped out in about four hours and a quarter. It cost about two million dollars.

L. L. S., OF R. I.—There is no objection to the use of India-rubber car-springs in hot climates. Prof. E. N. Horsford, some years since, made some experiments to test this matter. Vulcanized rubber was subjected to a temperature of 140° Fahr. for thirty hours without change. The bloom of sulphur was brought out after seventeen hours to a temperature varying from 140° to 212°, but there was no perceptible change in the texture of the material. Only in dry air at 212° for eighteen hours did it begin to deteriorate.

THE DANKS FURNACE ABROAD.—Masters in Birmingham and adjacent iron districts have all alike united in subscribing a fund of a few thousand pounds, which is being used in the erecting of Danks's machinery in the North of England, for the testing there, to the advantage of the whole trade throughout Great Britain, the invention that has proved so successful in the States, and upon which the commissioners sent out to America by the Iron and Steel Institute will soon report in detail. Ironmasters here who have most knowledge have no doubt whatever of the success of the plan; and they are arranging to be amongst the first who shall adopt it in this country. The great outlay which the erecting of the machinery will entail will not reduce expenses for some time.—*English paper.*

Kindling Fires by Gas.

[From the *American Gas-Light Journal.*]

THE AMERICAN ARTISAN, that sterling technical journal, to which we are so often indebted, furnishes us to-day an item headed "Gas Pokers," on which a few words of comment may be instructive. The invention referred to, and which is very well described, is that patented in England, December 12, 1854, by George Henry Bachhoffner. In this connection, we quote from a pamphlet published in 1870 by John Campbell, of Glasgow, called the "Gas-Light Manual":

"House fires can be kindled with gas by means of two Bunsen or ordinary burners, connected by an india-rubber tube to the gas-pipe, in twelve minutes, at a cost of one-tenth of a penny. The coals have merely to be broken up, and the burners applied. Neither paper nor wood is required, and the hands need not be soiled."

There can be no doubt that in towns where bituminous coals are in use, such methods could be much more readily made available now than in 1854, as flexible caoutchouc tubes are now so attainable. With anthracite coal, however, the Bunsen burner, unless of immense size and power, fails altogether in the very cases where it is most important—those of cooking stoves—its flame being so readily extinguished by a body colder than itself that it cannot penetrate through the grate, or even through the fuel itself. A quite different arrangement is necessary to meet this case, and the writer may add, without going into particulars at this present time, that he has himself been engaged upon such a plan, his principle being the combination, in various simple ways, with a gas-jet of a jet of air, making what may be called a *Gas Blow-Pipe Kindler*, the power and rapidity of action of which, even in case of anthracite, are surprising.

Wanted—A Remedy for Candle-smoke.

ONE of the things yet to be invented is a candle that will not smoke in compressed air, as, for example, in the air-chambers of caissons, like that of the East River Bridge. Whoever *does* this will be a public benefactor, for the smoke is an unmitigated nuisance. This is due, no doubt, to two causes. The gases liberated by the heat are under the abnormal pressure, and, therefore, reduced in volume; hence there is a smaller flame and less surface exposed to the oxygen of the air.

Again, the heat due to the combustion of a fixed quantity of gas is itself an unchangeable quantity. In the normal atmosphere, this is sufficient to create a circulation of air about the flame, by heating and rarefying the particles that come in contact with it. Of course, when the density of the air is doubled, twice as many particles as before have to be heated to create the same circulation, and the result is that much of the time a large part of the carbon passes off unconsumed for the lack of a proper supply of oxygen.—*Exchange.*

AN "OLD, OLD SHIP."—There is a ship now sailing from Holland, built in 1568, when the Prince of Orange was fighting Philip II. of Spain, then at the zenith of his power. She was sailing to the Indies when the Hollanders organized themselves into the "Beggars of the Sea," and as privateersmen earned a reputation which astonished the world. The Dutch ship is called the *Commissaries des Konig von der Heine.* She passed the Cape of Good Hope, October, 1864, from Batavia for Holland, then 294 years old.

The Circular Slide Valve.

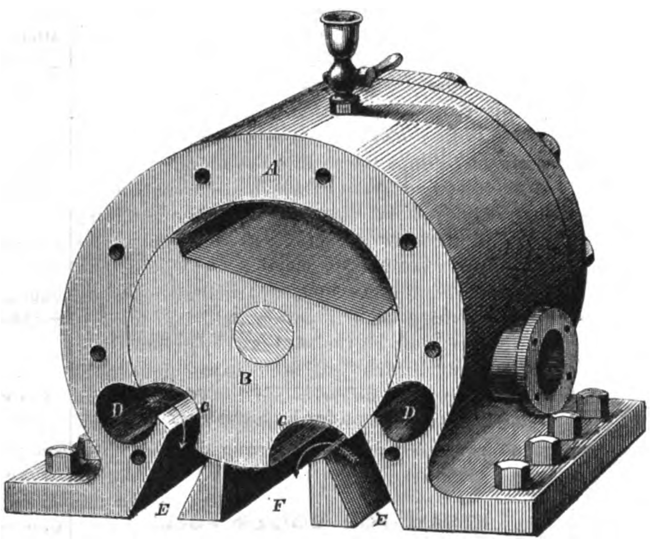
THE accompanying engraving illustrates a new valve for locomotive and steam engines of every description, the improvement being applicable to any slide-valve engine.

The invention consists of but two parts—a steam chest, A, bolted on the cylinder in the usual manner, and the valve, B, working back and forth in the chest, actuated as usual by an eccentric, the grooves C, C, in the valve alternately acting as supply and exhaust ports. The exgraving represents a cross-section of the steam chest and valve, showing their interior construction, the arrows giving the course of the steam to and from the cylinder.

The object of this invention is to furnish a cheap, simple, and durable substitute for the slide-valve, which will enable a steam engine to exert all its power in actual work, instead of wasting, as at present, a very large portion of it in pressure and friction on the slide-valve. This is accomplished by obviating all steam pressure in the steam chest, and reducing all friction to the lowest possible minimum.

But few engineers comprehend the waste of power in the present slide-valve, especially as it is now adapted for use on all the railways of the world. Mr. W. G. Beattie, in a well-considered article recently published in the London *Artizan*, thus demonstrates this:—

"An ordinary locomotive slide-valve 10 inches long by 17 inches width, makes an area of 170 square inches under steam pressure for an engine of 17-inch cylinders. At 125 pounds pressure of steam in the valve chests, this amounts to a total pressure of 22,000 pounds. From this must be deducted the pressure under the valve exerted by the steam in the cylinders. . . The results of indicator diagrams show this to be 435 pounds in the first third of the stroke, 1,901 pounds in the second third, and 2,133 pounds in the last third, or a mean pressure of 1,490 pounds throughout. Deducting this from the 22,000 pounds pressure on the back of the valves, there remains an effective pressure of 20,510 pounds on the back of each valve," or 41,020 pounds upon the pair of valves. This is about the weight of a couple of box freight-cars, thus concentrated in the confined space of the chests on top of a pair of locomotive cylinders, which must be shifted several inches before a train of cars can be moved at all.



THE CIRCULAR SLIDE VALVE.

It has long been the aim of engineers to avoid this enormous waste of power, amounting in most cases to half the working power of the engine. The present device is confidently offered as effecting this most completely on steam engines of any size or used for any purpose whatever, on either land or water.

This valve has as much or more superficial surface as the slide-valve, and being made like it of plain solid cast-iron, cannot wear any faster, in fact not so fast, as there is no pressure, and it can as easily be repaired. It has no complicated parts, or springs, or "dash-pots," or brass seats to wear or cut out, the surfaces being all cast-iron, finished in lathe and planer, without any hand-work. One of them has been used constantly for more than six months, on a fifty horse-power engine, without showing the slightest sign of wear.

For locomotive use, where there is sufficient weight on the drivers, from four to eight more loaded freight-cars can be hauled than with the slide-valve. Thus far, the experience of the inventor warrants him in saying that the use of this valve is equivalent to an increase of one-third to one-half more boiler, and consequently more fuel, to the common steam-engine. One of these valves was placed on the large engine which drives the heavy machinery of the Burlington (Iowa) paper-mills, and after six months' trial, the proprietors say:—"Its operation has astonished us. Last year we had to carry 70 to 90 lbs. of steam, now we never need more than 40, and 30 lbs. is usually enough. We have repeatedly started up with ten pounds. The small slide-valve engine running our paper machine-stops with 35 lbs. The engine is the same except steam-chest and valve."

This invention was patented Nov. 14, 1861, by J. F. Tallant, Burlington, Iowa, who offers every inducement to steam-engine builders and railroad master-mechanics to fully test its value. Plans and drawings will be furnished free, and every information given on application.

The Japan Trade.

THE total of vessels entering Yokohama port for the year ending last September was 392. Of these 199 were steamers. These vessels had a gross tunnage of 386,112 tuns, divided as follows: American, 250,026 tuns; English, 93,304; other countries, 42,872. Of the American tunnage 56,135 tuns were from the United States, the rest from coast and China ports. The total number of vessels cleared from the port of Yokohama is 406, with a total tunnage of 395,539. Of this amount 248,732 was in American vessels, 72,648 in British, and 74,159 in vessels of other countries. Of the American tunnage, 57,912 were for the United States. On these vessels the Japanese custom-houses have collected the following tunnage dues: —Entrance fees ($15), $5,880; clearance fees ($7), $5,842.

INCREASING TUNNAGE OF MERCHANT VESSELS. —It is but a few years since the largest ships in the mercantile marine did not exceed six hundred tuns burthen, while at present the average of sea-going ships is probably near 1,000 tuns, and many as large as 2,000 tuns. The *Great Republic*, of 3,500 tuns, was an exception. Thus the large fleet of steamships have taken the place of the sailing-vessels, and seem to be fast driving the latter from the ocean.

BROWN, COOMBS & CO., Publishers.
ISSUED WEEKLY AT
No 189 Broadway, New York.
S. T. BROWN. J. W. COOMBS.

AGENTS.
AMERICAN NEWS COMPANY.................New York City.
NEW YORK NEWS COMPANY................ do
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WEDNESDAY, JANUARY 24, 1872.

COLLIERY EXPLOSIONS.

At the hour of the present writing, there is news by telegraph from London of a terrible fire-damp explosion in the Oakwood Colliery, in Wales. All the miners are believed to have perished, eleven having been taken out dead, and search being prosecuted for the remainder. The flame from the explosion ignited the timber of the structures in and about the works, and the buildings and machinery are reported as wholly consumed. It is not long since a similar casualty occurred in another English coal-mine, and one also of like character, costing many lives, happened only a few months ago in the mines of St. Etienne, in France. Aside from steam-boiler explosions, there seems to be no more common or culpable cause of deadly accidents than mines. In speaking of these last, and the frequency of deaths from fire, choke-damp, and explosion in them, the New York *Tribune* safely says that "either science is at fault with its appliances, or the cupidity of proprietors neglects the proper precautions." But this is only a superficial view of the matter.

Science, or rather art, using the latter term in its most prosaic sense, is not at fault in this matter. An apparatus was devised in England a number of years since for detecting at once the presence of fire-damp in a mine. More than one safety-lamp has been constructed to be automatically extinguished the moment the proportion of light carbureted hydrogen in the atmosphere approached the point of danger. The plan has been suggested, with every apparent argument in its favor, that through the galleries and chambers an electric wire be extended, with, at intervals, sections of diminished diameter, so that on sending, from the surface, an electric current through the wire, the section would be heated to redness, and thus ignite and explode the fire-damp, should such exist, designedly, and when no one was underground to be hurt by it. These and many other appliances have been urged upon the attention of mine owners and managers without inducing adoption. They have been produced in the face of neglect, and even of opposition, and, this being so, there is no saying what safeguards, yet unknown, to life and limb in collieries might not have been brought out had such apparatus met with encouragement instead of the reverse. For example, there would be little difficulty and much usefulness in connecting a self-extinguishing safety-lamp in an exposed part of the mine with an electric signal, to sound at the surface on the first advent of fire or of choke damp. But we have yet to learn that anything of the kind has been done. Neither scientists who discover nature's laws, nor inventors who devise ways of applying them, are responsible for the loss of life in mines. This responsibility must be shared by managers and miners alike. The cupidity of the former may lead to the neglect of proper precautions, but the proverbial carelessness of mining operatives must bear its own portion of the blame. Casualties will become few and far between when both classes shall become fully aware, as they do not yet appear to be, that human life is of more consequence than even dividends on stock or increased rates of wages.

COTTON-GINS FOR HINDOSTAN.

The indigenous cotton of India gives up its seed very easily to the "churka," the Hindoo ginning apparatus. But the American cotton, which has of late years been extensively introduced in the land of Juggernaut, does nothing of the kind. On the contrary, it holds on to its own with Yankee tenacity, and therefore the Indian Government has offered prizes for cotton-gins which will thoroughly clean the fiber from the seed. We do not infer that the authorities will be satisfied with ginning no better than is commonly obtained in this country, for it would be as easy for them to import our ginning machinery as to import our cotton seed. But what is wished for is an apparatus that will take the fiber from the seed as cleanly in the first instance as it is done by the now adopted secondary operation of linting. This latter, it may be remarked, consists in subjecting the woolly surfaces of the seed to the action of a saw-gin, the finely cut teeth of which are miniatures of those employed in the larger or common gin. Should the efforts of the Indian Government be successful in securing a machine capable of the desired perfection in its work, it will have an important bearing on our cotton industry, for the loss by fiber left on the seed is very great. It is true that by "linting" the seed, as just described, the waste fiber can be recovered, but its quality is, of course, inferior, and the cost of the linting is by no means an inconsiderable item.

STRAW FOR BOILER FUEL.

In no way does the rapid dissemination of information from one country to another bear better fruit than in the development of industries. In California the thrashed straw from vast fields of grain is of little worth, but the steam-power required in thrashing is expensive, because of the cost of fuel. No one on the Pacific Coast appears to have thought of adapting the fire-box of the portable boiler to burning straw until experiments in far-off Hungary were heard of. In that country, straw for fuel was found to cost but one-seventh as much as wood in the furnace. In one experiment, it is stated, a sixteen horse-power engine thrashed four hundred and eighty bushels of grain in twelve hours, with a weight of straw equal to that of half a cord of oak. The story seems extravagant, and we mention it for what it is worth; but there can be no doubt that the quick, fierce blaze of the straw, properly fed to a furnace of suitable construction, might be made to produce a more effective generation of steam than the comparatively slow and sullen combustion of the wood. The plan, at all events, is thought, by Californians well qualified to judge, to be worthy of extended trial on the coast, and it cannot be denied that dry straw should make a better furnace-fire than the wet tan or the damp sawdust successfully used respectively in the furnaces of our Eastern tanneries and lumber establishments.

WOODEN WATER-PIPES.

An agricultural exchange advocates the substitution of wooden water-pipes for drain tiles. This, if successfully accomplished, would partake of the marvellous, for the office of a wooden pipe, like that of an iron or lead pipe, is simply to conduct water from one locality to another, while the function of tiles is to permit water to percolate through their porous substance, draining out of the soil through the channel thus provided, and flowing to any point desired at a lower level. But the suggestion that wooden pipes could be very profitably used in lieu of more expensive mineral or metal ones has a good deal of reason in it. Provided that the stuff be of good quality and the pipe properly made, it will be likely to last much longer than lead or iron. Four or five years since, some bored logs were taken up by the Croton Department in New York City, and found to be in quite good condition, although they had been buried in the sodden "made-ground" of the streets for nearly half a century. But for ordinary use in place of metal or mineral pipe, bored pipes nowadays cost too much. Wooden pipe should now be made of plank, of the best quality, put together by machinery, with rabeted and cemented joints between the longitudinal strips composing each section, and with simple and convenient devices for joining the sections continuously to each other. The treatment of the wood with chemicals to nsure its preservation has been suggested with much plausibility, and, provided no bad taste or deleterious quality were communicated to the water, the practice would be a good one. But of much more importance than any such treatment would be the judicious selection of timber in their manufacture, and a simple, cheap, and efficient method of making the pipes without waste from sawed stuff.

BRITISH STEAM TILLAGE.

The extent to which steam tillage is being prosecuted in Great Britain is indicated by the activity shown in the works of Messrs. Fowler, who appear to have almost a monopoly in this class of machinery. They have, so says the London *Times*, for months turned out from six to eight plowing engines per week. That this should be, in spite of the excessive cost of the machines, say seven thousand five hundred dollars gold in England for a twelve horse-power apparatus, proves conclusively the superiority of the deep tillage by steam over the moderate depth practicable with horses. This development of the method is due to the contract system, by which parties make it a business to own steam-plowing apparatus and to cultivate land for farmers at specified rates. Some of these contractors do a very heavy business and employ a large capital. For instance, the authority just quoted states that one of these steam-plowing firms in Kent "has six double-engine sets, while a contractor in Lincolnshire has now ten sets of machinery, representing a capital of £20,000. The Northumberland Steam Cultivating Company have 20 sets of apparatus, consisting of 40 engines with implements, their capital being £42,000, and the area of land worked per year about 60,000 acres. The Durham and North Yorkshire Company have 12 sets, with a capital of £42,000, seven of their sets having been purchased since the Wolverhampton meeting. The York Company have just started with 8 sets, and a capital of £15,000; and the Scottish Company, originated by Lord Dunmore, have 10 sets, with a proportionate capital, of which the farmers in each district and county subscribe their share."

Such, in brief, is the most advanced phase of what may be termed the business management of British steam tillage. That this business management will have to be very closely imitated in the successful introduction of an American system of steam culture can scarcely be doubted, and to this end it is worthy of being closely studied. But in the origination of a system adapted to the needs of agriculture in this country, no mere imitation of the machinery approved abroad will have much chance of success. Our soil is different, our rates of wages are different, the stretch and range of our arable lands are different, and our steam-driven plowing machinery will have to be different too.

THE WHALE FISHERY.

SOME years since, there went the rounds of the press a well-written paragraph concerning the "last ship" of Nantucket—the last whaler owned in the place so long identified with the fishery, and which was sold for other uses. There seems a likelihood that New Bedford will soon follow in the same way, for more than a dozen vessels there are now offered for sale, and several of the most extensive owners are about to retire from business. "Nevertheless," says an exchange, "a number of vessels will be despatched to the whaling grounds in the spring, and the Arctic fleet, next season, will probably number 25—23 American, 1 Hawaiian, and 1 English. The American right whaling fleet embraced only 9 vessels the past season, but the catch, 3,825 barrels, was larger than for four years previously. The success of the sperm whaler has been fair, compared with the small average of late years, but does not approximate the magnificent catches of former times. The fleet is distributed about as follows: 34 vessels in the Indian Ocean, 26 in the Pacific, 16 in the South Pacific, 6 in the South Atlantic, and 27 in the North Atlantic. Although this is a by no means despicable showing, the mournful fact remains that during 1871 only one vessel was added to the whaling-fleet, while 72 were lost to the business, 35 of these being wrecked or abandoned.

NOTES FROM OUR FRENCH EXCHANGES.

NEW EVAPORATING APPARATUS.—M. Alex. Wérotte, of Liège, having been under the necessity of concentrating a liquid which, from its peculiar properties, was rebellious against all known processes of evaporation, was led to seek, and has happily found, an arrangement which has given the most complete success. It has been in operation for the last twenty months. He treated at Liège the water of suint, according to the processes of Maumené and of Rozelet, and according to that of Verviers, the water derived from the soaking of raw wool, or *les eaux de trempage*. The water of suint is produced by the filtration of cold water through the wool. Its concentration is very difficult. *Les eaux de trempage* are obtained by agitating the mass of raw wool in water moderately warmed. It contains not only the suint soluble in cold water, but also grease existing in the wool, and considerable quantities of insoluble matter held indefinitely in suspension in the mass of the liquid. These cannot be separated either by decantation or filtration.

Neither evaporators having naked fires, nor those heated by circulation of steam in pipes, could be used. Nor could ordinary furnaces be adopted. It was found necessary to devise an economical evaporating furnace, with a heating surface as small as possible. It was then suggested to throw down into the liquid the hot gases lost or formed in the fire, and afterwards to withdraw them, together with the vapor produced, in order, finally, at a low temperature, to throw them into the atmosphere.

The apparatus comprises a furnace with an ordinary grate, communicating with the upper part of a chamber, containing in its lower portion the liquid to be evaporated. This upper portion of the chamber is divided into two portions by a vertical partition, the inferior edge of which dips below the surface of the liquid. That one of the compartments just indicated, furthest from the furnace, communicates by a peculiar flue with a centrifugal exhaust fan. The hot gaseous products of combustion pass into one of the compartments, are drawn down through the liquid, rise at opposite side of the partition into the second compartment, and with the vapor generated from the liquid are exhausted by the action of the fan, the increased evaporation being, of course, due to the intimate contact of the heated gases with the particles of the water through which it passes.—*Les Mondes*.

EFFECT OF COLD ON THE LIGHTING POWER OF GAS.—In experiments made at Munich, when the U-tube was plunged in snow, and the temperature of the gas reduced to thirty-two degrees, it was found that the illuminating power diminished from 100 to a point varying between 75 and 86 per cent. In other words, the light was diminished to a mean of 20 per cent. And when the temperature of the gas was brought still lower, by the employment of a mixture of salt and snow, four degrees below zero, the lighting power was reduced more than a third, being from 33 to 40 below the full lighting power of 100.

Other experiments, made within the limits of ordinary gas-practice, have given wholly different results; but the whole are enough in harmony with the principles that govern the combustion of gas. And from them it may be concluded, regarding the influence of heat and cold on the illuminating power of gas, with confidence, that neither produces any effect unless applied in such degree as to alter the constitution of the gas. This does not change between 32° and 300°, that is to say, under the only conditions of which it is necessary to take account.—*Journal de l'Eclairage au Gaz*.

DEPOSITS IN CONDENSERS.—In a great number of sugar making and refining establishments, the water from condensers is used for feeding the steam-boilers. This very often contains a large proportion of organic matter, which, acquiring the properties of mucus, may hinder the operation of the engine. Also, in its use, it is essential to renew the water frequently to the boilers, because the organic matter circulating in it contains nitrogenized compounds, which ferment rapidly in contact with the tubes of the condenser, and cover them with a gelatinous deposit, white and red, and augmenting also the tendency of the water to become viscous. It is possible, in our opinion, to guard in part against this inconvenience by impregnating the surface of the tubes with heavy oil or gas-tar. We would remark, in substance, that, if the surfaces of the condenser are sometimes cleansed of the gelatinous matters, these last, moreover, as a result of this mechanical removal, will not adhere again.—*Bulletin du Musée de l'Industrie*.

SEA-WATER FOR MAKING BREAD AND FOR SOUP.—M. Moison, in a letter concerning the use of sea-water in the fabrication of bread in the environs of Concale, remarks that, on all the neighboring coast of that hamlet which is inhabited, the yeast only is made with fresh water, and that it is exclusively pure water of the sea which is employed in the preparation of the dough; the bread obtained has only the necessary amount of salt. On the contrary, when the water of the sea is added to soup, a food is obtained which is rejected. The writer asks if there cannot be seen in these two results the proof of a special transformation that the baking of bread causes certain salts dissolved in the sea-water to undergo. He calls, among other things, the attention of the Academy of Sciences to the good hygienic effects which he attributes to the use of bread salted with the water of the sea.—*Les Mondes*.

PROPERTIES OF SICCATIVE OILS.—In the operation of boiling in contact with litharge and with minium, the loss of oil is so slight that it permits one to regard boiled linseed oil as a simple isometric modification of that which is raw. This linseed oil, if its boiling is pushed too far, takes the consistence of molasses when it has lost five per cent. of its weight, and it changes to caoutchouc when it has lost twelve per cent.

It is not the concentration of the oil that gives it its siccative property. It is necessary, then, to return, as Saussure, to attributing the resinification of the oil to the absorption of oxygen, which should be as much more rapid as the oil-kettle is more thin, and the temperature of the surrounding air more elevated.

The thinner the oil-kettles, the more lively the exiccation; it is therefore a loss of time and of oil to have the kettles thick, and the only use of the essence of terebinth (oil of turpentine) is to reduce it to a state of more minute subdivision in order to facilitate oxydation. The oxydation is more active as the surrounding temperature is more raised at 253° Fahr.; it is exactly one-half less rapid than at 271°, which justifies the practice of varnishers, who, in winter, put varnished furniture in a heated apartment, and in summer expose it to the sun.

M. P. Thenard communicates to the Academy that in his country — in Burgundy — frequent usage is made of oil well boiled with litharge for painting light carriages. This was in 1853 that this practice was introduced, and it has since extended. This painting is better than that which does not readily dry, as it makes always a varnished surface that does not hold the dust.—*Les Mondes*.

A Sunken Gun.

IF anything is "not lost when you know where it is," the remark will apply to a 12-tun gun, worth $20,000, recently sunk in Bombay Harbor. The *Jumna*, a short time ago, took out from England six new 12-tun guns for the protection of the harbor. As soon as the ship was ready for unloading, suitable tackle was obtained, and a boat came alongside the *Jumna*. When the first cannon, well secured, was lowered into the boat, it almost sank her. To save the boatmen, the order was given to rehoist. The boat, happily, pulled off a little, for the slings intended for lowering proved insufficient for raising the mass of metal, and gave way. There was one tremendous splash, and the last was seen of the 12-tun gun. Divers could find no other trace of it than a sort of dimple in the mud where it had disappeared. They probed deep, as a doctor would for a bullet, but with no success; and, considering the nature of the harbor bottom, some 28 feet of mud in parts, it is tolerably certain that this lost treasure will rest in its present bed for many centuries.

COMMISSIONER OF PATENTS' DECISIONS.

DAWES AND FANNING.—*Ex parte.*

[Appeal from the Examiner of Trade-Marks.]

WHAT MAY CONSTITUTE A LEGAL TRADE-MARK.

The Act of July 8, 1870, makes it the duty of the Commissioner to decide whether a proposed device is a legal trade-mark or not.

The Act of Congress does not attempt to define what may constitute a trade-mark, but directs the Commissioner not to register the mere name of a person, firm, or corporation.

The proposed trade mark must not be one evidently intended or well calculated to deceive the public as to the true origin or character of the goods to which it is attached.

It must not consist merely of words or characters descriptive of the quality of the article to which it is attached, nor such as are generic in their signification.

A trade-mark must be of such character as, when attached to goods in the market, will distinguish them as to origin from others of the same class. To do this, it need not necessarily give the name of the person owning said mark, nor the place where the goods are made or sold.

LEGGETT, *Commissioner:*

The applicants are manufacturers of umbrellas covered with cotton, finished in imitation of alpaca, and they desire to have registered the number "140" as a trade-mark, to be attached to such umbrellas, and used in their advertisements. The examiner rejects the application on the ground that "the mere numerals '140' do not constitute a lawful trade-mark under the Act of July 8, 1870."

The act referred to nowhere attempts to define a trade-mark. Section 79 excludes from the registration the "mere name of a person, firm, or corporation." The same section also says "the Commissioner shall not receive and record any proposed trade-mark which is not and cannot become a lawful trade-mark." Beyond these limitations, the law authorizing registration gives no intimation as to what is or what is not a lawful trade-mark. This question must be determined by the teachings of common law and the rulings of the courts.

The following summary, I believe, embraces the statutory limitations, and the doctrines upon the subject as promulgated by the courts, and may be sufficient to guide the office in distinguishing between lawful and unlawful trade-marks.

1. The mark sought to be registered must not be the mere name of a person, firm, or corporation. *Section* 79 *of Act of July* 8, 1870.

2. It must not be one evidently intended or well calculated to deceive the public as to the true character or origin of the article to which it is attached. Such a mark would be injurious to the public, and therefore its registry should be refused. *Christy vs. Murphy*, 12 How. Pr., 78; *Dale vs. Smithson*, 12 How. Pr., 239; *Pidding vs. Howe*, 8 Simons, 477; *Singleton vs. Bolton*, 3 Doug., 293; *Perry vs. Truefitt*, 6 Beavan, 66; *Hobbs vs. Francis*, 19 How. Pr., 571.

3. It must not consist merely of words or characters descriptive of the quality of the article to which it is attached, nor such as are generic in their signification. Such words and characters are common property, and may be used for the same purpose by any person engaged in manufacturing or selling a similar article. *Amoskeag Manufacturing Co. vs. Spear*, 2 Sand. S. C., 606; *Stokes vs. Landgraff*, 17 Barb. S. C., 609; *Fetridge vs. Wells*, 13 How. Pr., 388; *Corwin vs. Daly*, Upton, 191.

The names of persons, firms, or corporations, and generic names and words descriptive of quality, may be used in trade-marks, provided they are accompanied by original devices to which others have not an equal right; but in such cases the original devices really become the trade-marks. *Fetridge vs. Merchant*, 4 Abb. Pr., 158; *Davis vs. Kendall*, 2 R. I., 569.

4. It must be of such character as, when attached to the applicant's goods in the market, will distinguish them as to origin from other goods of the same class. To do this it need not necessarily give the name of the person owning said mark, nor the place where the goods are made or sold. It is enough if the mark is of such character as to indicate to the purchaser that all articles bearing it come from one and the same source.

The object a man has in view in adopting a trade-mark is to secure to himself the benefits arising from the superior merits of his goods over others of the same class. To do this he puts upon them a peculiar mark, that purchasers may be able to distinguish them in the market. It matters not to him nor to others whether the purchasers know either his name or place of business, provided that his goods have some mark by which they may be designated and inquired for.

The position taken by Upton in his work on "Trade-marks," that the trade-mark must show either the owner's name or place of business, or both, I believe, is sustained neither by reason nor by the decisions of courts. He has evidently been misled by the use of the terms "source" and "origin" by the courts in discussing this subject. It is clear to my mind that, when the courts say the office of a trade-mark is to indicate the "source" or "origin" of goods, they do not mean thereby that the place of business or name of the owner must necessarily become a part of it.

In the case of *Filley vs. Fassett*, Justice Currier, of the Supreme Court of Missouri, says: "The books are full of authority establishing the proposition, that any contrivance, device, name, symbol, or other thing may be employed as a trade-mark which is adapted to accomplish the object proposed by it—that is, *to point out the true source and origin of the goods to which said mark is applied.*" Under this proposition the court sustained as good and sufficient the words "Charter Oak," accompanied by the forms of oak leaves, as a trade-mark for stoves, although no other words or signs were used to express origin, source, or ownership, and the learned judge remarked: "The name and device selected by the plaintiff were adopted to point out the *true source and origin* of the stoves to which he applied them, and were, therefore, possessed of the requisite characteristics of a trade-mark."—Am. Law Reg., N. S., vol. viii. 406, 407.

In the case of *Ainsworth vs. Walmsley*, 1 Law Rep., Eq. Cas., 252, the court says that "it is sufficient that the name or symbol in its application to the goods be so far *original and peculiar* as to be capable of distinguishing, when known in the market, one manufacturer's goods from those of another." The source and origin may be indicated by the originality and peculiarity of the trade-mark, whether it be words, figures, or symbols.

Justice Ingraham says, in the case of *Wolfe vs. Goulard*, 18 How. Pr., 67: "When a person forms a new word to designate an article made by him which has never been used before, he may obtain such a right to that name as to entitle him to the sole use of it as against others who attempt to use it for the sale of similar articles."

In the case of *Burnett et al vs. Phalon*, 9 Bosw., 206, Justice Robertson says: "A manufacturer of or dealer in any goods has a right to designate them as being made or sold by him by a mark or device, such as 'Cocoaine';" thus indicating clearly that a mere unmeaning device is sufficient to indicate origin to the full extent required by law.

In the case of *Williams vs. Johnson*, 2 Bosw., 6, Justice Woodruff says: "If the plaintiffs had chosen to stamp their soap with some figure or other impression having no other meaning than to distinguish their manufacture from that of others, and had given it out as their mark, and by this discrimination soap of their manufacture had acquired reputation and sale, they would be plainly entitled to protection;" thereby indicating that it is enough if the mark is sufficient to distinguish the goods to which it is applied in the market.

I do not deem it necessary to carry this discussion further at present. In a few cases, the courts have expressed themselves as not entirely satisfied with the doctrine here set forth, but I know of no American decision that gives authoritative announcement against it, while the general spirit of the decisions of the courts in trade-mark cases fully sustain it.

Try the applicant's device by these tests. First, it is not the mere name of a person, firm, or corporation. Second, there is nothing in it calculated to deceive any one as to the true origin or character of the umbrellas to which it is attached. Third, it is not generic in its signification nor description of quality. Fourth, it is an arbitrary combination of numerals, having, as used, no other meaning than to distinguish the applicant's goods in the market, and indicate to purchasers that all umbrellas bearing this mark have one and the same origin. It is true, "140" is a common arrangement of numerals, but a common word or figure may be used as a trade-mark, provided it is not used with its ordinary signification.—*Messerole vs. Tynberg*, 4 Abb. Pr., N. S., 414.

The decision of the examiner of trade-marks is reversed, and the certificate of registration will be granted.

TO CORRESPONDENTS.

We wish our readers to understand that, in freely publishing communications, we do not hold ourselves responsible for the opinions of our correspondents, inasmuch as we may occasionally publish views opposed to our own.

MESSRS. EDITORS:—I come to solicit information from or through your journal that will perhaps serve others besides myself. In experimenting with electro-metallurgy, three troubles present themselves:—1st, in silver-plating, I find the deposit *gray instead of white*, and although I have used bisulphide of carbon in my solution, cannot get a *bright* deposit. Have ample battery power, but only use one pair (Woolaston's) .5 by 4 inch surface in acid, copper each side of zinc. A curious result happened me in attempting to cover a plaster bust with copper, which I would like to have explained. After preparing very carefully with plumbago, and seeing every part properly covered, I submerged it in the solution of sulphate of copper, but found that the handling and moisture had removed the coating in spots, and I feared they would not take, but to my astonishment found they were the only parts on which the metal had precipitated; of course this spoiled the figure, because had I left it to cover from the edges, it would leave the face full of ridges. Hoping for a reply, I remain yours, respectfully,

MACHINIST.

TIFFIN, OHIO, Jan. 16, 1872.

[Will some of our readers who have had practical experience in electro-metallurgy answer the queries of "Machinist?"—EDS.

NEW AMERICAN PATENTS.

We give, as follows, notices of some of the most interesting inventions for which Letters-Patents of the United States have recently been issued :—

Paper-bag Machine.—L. D. Benner, Boston, Mass.—*Jan.* 9.—This improvement in making paper bags consists in first doubling over or folding the strip of paper across the center of its length, and then folding and reverse folding the side edges, so as to form a bag of the desired shape. The invention also includes two formers, having respectively hinged folding-leaves, suitably arranged to fold the paper.

Sealing the Nozzles of Oil-cans.—J. A. Bostwick, New York City.—*Jan.* 9.—In this a film of glue, collodion, shellac, or other tough and tenacious substance, is applied to and combined with the joint of the valve or stopper in a top, nozzle, or cap for oil-cans or other vessels, to hermetically seal the same.

Locked Plug Connection. — J. B. Edson, Brooklyn, N. Y.—*Jan.* 9.—This device is constituted by the combination of a cock-plug connection and a meter, when one end of the said plug-cock passes into a case in such manner that communication through the plug cannot be interrupted without access to the inside of the apparatus, and whereby the latter may be relieved from pressure without uncoupling.

Machine for coiling Springs.—T. W. Rhinelander, New York City, and J. L. Hornig, Jersey City, N. J.—*Jan.* 9.—These inventors claim, in machines for coiling metallic springs, the combination of a coiling mandrel, feed-nut, and screw, with grooved feed-cones and their spindles, and an adjustable friction-wheel or other intermediary for communicating motion from one cone to the other. Also, in combination with the parts above named of a press-roller, operating in connection with the coiling mandrel. Also, the press-roller provided with an adjustable gauge or band for regulating the length of the spirals in combination with the coiling mandrel. Also, the combination with the coiling mandrel of a dog for holding the end of the bar to be coiled, a dog wedge plate, and a slotted and grooved collar or projection in which the dog works, these parts being suitably arranged for joint operation. Several other novel combinations of parts, adjunctive to those just specified, are also included in the invention.

Manufacture of Iron.—J. J. Johnston, Allegheny, Pa.—*Jan.* 9.—The essential elements of this invention comprise, firstly, mixing pulverized iron ore, or other metallic oxyd, with melted cast-iron ; and, secondly, forming ingots for the manufacture of steel, and blooms for the manufacture of wrought or malleable iron, by mixing pulverized iron ore, or other metallic oxyds, with melted cast-iron.

Torsion Spring for Vehicles.—C. W. Saladee, St. Catherine's, Canada.—*Jan.* 9.—This improvement includes forming torsion springs of two straight pieces, with their inner ends firmly and rigidly held by a central standard-bearing, and their outer ends allowed to vibrate freely in other suitably arranged standard-bearings.

Articles of Food, or Pearl Wheat.—J. E. Weaver, Havelock, Pa.—*Jan.* 9.—This new article of manufacture is constituted by grains of wheat freed from their integument, gluten, and water, retaining only their starch, gluten, and gum, and putting up the said grains of wheat in paper packages, whereby their quality and commercial value are increased.

Fare-box.—H. Baranger, St. Louis, Mo.—*Jan.* 9.—This fare-box is provided with two reverse acting tilting platforms, said platforms being operated by an inwardly swinging door hung at its upper end to the box, the opening of which brings the upper platform to a horizontal position, and the lower platform to a vertical position, and the closing movement restores said platforms to their respective vertical and horizontal positions. A novel combination of parts is also included to further insure the efficient operation of the apparatus.

Sewing-machine.—C. F. Bosworth, Milford, Conn.—*Jan.* 9.—The gist of this invention is found in the combination of a shuttle or equivalent mechanism carrying one thread, and a hooked or barbed needle, with a mechanism to cause the said needle to take or release a second or needle thread. Also, in combination with the subject-matter of the above clause is claimed a suitably constructed and applied hook.

Corn-harvester.—J. Burke, Sycamore, Ill.—*Jan.* 9.—This improved corn-harvester has its cutting knives made with their front ends curved outward and their straight cutting edges overlapping, and having no pivotal connection to the frame, but held together by springs, whereby the stalks are cut by a steady and constant pressure of the knives on opposite sides of the stalks as the machine is drawn along.

Ice Pitcher.—J. Dawson, New York City.—*Jan.* 9.—In this, a double-walled metallic ice pitcher or other vessel, the plates forming the double side walls, the bottom, and the cover, or either, are combined with a hollow metallic filling piece or backing, interposed between and supporting said plates.

Concrete Pavement.—S. Filbert, Philadelphia, Pa.—*Jan.* 9.—The characteristic features of this improvement embrace the substratum of a pavement composed of broken stone or gravel, or both, worked with mortar or cement. Also, the combination in a pavement of a substratum composed of broken stone or gravel, or both, placed upon or worked together with any suitable mortar or any hydraulic cement, and covered with a concrete mixture of any suitable materials. Also, the combination in a pavement of a base or substratum substantially such as described, and a vulcanite composition.

Device for moving Blind-slats.—L. Gathmann, Chicago, Ill.—*Jan.* 9.—In this device is combined a socket and a spring on the journal of the blind-slat, with a shaft and worm located in the window-frame, all constructed and arranged for joint operation in such a way that the slats of the blind can be readily adjusted.

Railway Frog.—W. Morris, Harrison, N. J. —*Jan.* 9.—In this apparatus is used a wedge-shaped block, arranged at the joint and confined between the split ends of the pointed rail, and secured in place by transverse bolts, in combination with a wedged-shaped block confined between the rails at the joint.

Elevated Railway.—J. E. Serrell, New York City.—*Jan.* 9.—It is proposed to construct this elevated railway with two tracks and a second sidewalk of suitable height, with platforms between the tracks and buildings and outside of such tracks, and appropriately provided with steps, balustrades, and openings.

Hot-air Furnace.—L. B. Tupper, New York City.—*Jan.* 9.—The most noticeable features of this apparatus are comprised in ranges of air-pipes introduced through thimbles in the plates of the furnace and above the fire, with a hot-air chamber at one end, and the other ends of such tubes open for the admission of air. Also, an air-chamber divided by plates and provided with separate air-pipes in combination with a heating furnace having ranges of air-heating tubes opening into the compartments of the air-chamber.

Truck.—A. Van Haagen and J. H. Cooper, Philadelphia, Pa.—*Jan.* 9.—This truck has its frame open at the rear, supported on wheels, and provided with movable arms or plates for supporting the load. There is also included in the invention the combination of the aforesaid frames and their arms with a slide, and with rods through the medium of which the arms can be raised or lowered. Also, the combination of the slide and a stop provided thereto with a suitably arranged bell-crank lever.

Screw-nozzle Cap-fastening.—William Gee, New York City.—*Jan.* 16.—This invention consists in the combination of a cap, a bail, and a set-screw, with trunnions provided on opposite sides of the external nut, by which the nozzle is secured in place.

Pen and Pencil Case.—John Cockburn, New York City.—*Jan.* 16.—This invention relates to a well-known construction of pencil-case, the peculiarity of which consists in the employment of what is termed "the magic movement," whereby on simply pulling on the outer end of an inner extension tube, not only is the lead-holder projected or made to protrude beyond the end of said tube, but the latter is also extended to give additional length to the pencil-case. This invention consists in making the parts of the movement as an entirety detachable and reversible within the case, instead of being a permanent fixture, as when used only for a pencil-case, and in combining with the end of the outer spirally slotted tube, opposite to that through which the lead-holder works, a "ball" or projecting end-piece, arranged to enter said tube, and a fast sleeve or ferrule fitted in a projecting manner over the same end of the tube, so that provision is made between said "ball" and sleeve for fitting in a pen, to use which it is only necessary to reverse the position, end for end, of the series of tubes connected with the "movement" within the outer shell, case, or holder.

Thill-coupling.—Benjamin W. Jager, Hainesville, N. Y.—*Jan.* 16.—This thill-coupling is composed of a V-shaped strap, provided at its ends with eyes for the reception of the coupling-bolt; one jaw of the V being broad to form a bearing against the axle, and having holes in it for the reception of a clip by which it is secured to the axle, leaving the other jaw, which is narrower, free to spring and be adjusted to the thickness of the thill, so that when the bolt is in its place there will be no rattling of the joint.

Pitman-rod Connection.—Edward G. Fish, Colfax, Iowa.—*Jan.* 16.—This invention relates to an improved construction of the pitman connection of a mowing or reaping machine, and is an improvement on one patented by the same inventor March 28, 1871, No. 113,039. It consists in a novel construction of the parts of the joint or connection and manner of securing them together, whereby it is made more durable and capable of adjustment, to compensate for the looseness consequent on wear ; sand or dirt is prevented from working into it, and other advantages are obtained.

Hoisting Apparatus.—Norton P. Otis, Yonkers, N. Y.—*Jan.* 16.—This invention relates to that description of safety hoisting apparatus in which counterpoises instead of springs are combined with the stop or safety pawls for forcing the latter into lock or gear with the ratchets of the hoistway or frame, up and down within which the car or platform travels. The invention consists in a novel attachment of each counterpoise with the pawl which it controls, whereby, in case of the breakage of the lifting-rope, the full power of said counterpoise or weight is caused to act upon the pawl to throw it into gear with its ratchet. In other arrangements of this description, the weights have been connected with the one short arm or end of each pawl-lever, while the lifting-rope has been attached to a long arm or end of said lever, thus giving the lifting-rope a large advantage over the counterpoise or weight on the pawl, so that any dragging action of the lifting rope, tending to hold back the pawls from engaging with the ratchets, requires a counteraction of the weights many times greater in order to overcome it. This difficulty is entirely obviated by the improved means or arrangement of levers, for establishing connection between the counterpoises and the pawls controlled by them.

Boiler of Locomotive Engines.—Philip W. Mackenzie, Blauveltville, N. Y.—*Jan.* 16.—This invention consists in a combination with the body of a locomotive engine boiler, of a fire-box constructed of a metallic shell lined with fire-brick, fire-clay, or other like refractory material, whereby increased strength and durability is given to the boiler. It also consists in a peculiar arched construction of the sides, as well as the roof of the fire-box, in combination with metallic angle pieces or stays for supporting the fire-brick or refractory lining in separate arches, whereby increased strength and greater facility of repair are obtained, and a convenient space is afforded for the driving-wheels of the locomotive engine on either side of the fire-box. The invention also comprises a novel arrangement, relatively with the furnace, of a pipe for supplying air to the latter over the fire, for the purpose of promoting the combustion of the gases in the furnace, said pipe being projected through a coal hopper on top of the fire-box, and being provided at its forward end with a valve or damper for regulating the admission of air over the fire.

Tie-rod for Blinds.—William E. Brock, New York City.—*Jan.* 16.—This invention is more especially intended for blinds which are constructed of metal, or with metal exteriors, for the purpose of making them fireproof. It consists in a tie rod

formed of a sheet-metal tube, having an internal longitudinal rib, and provided with a wooden filling, which has formed in it a longitudinal groove for the reception of said rib, which is thus made to keep the wooden filling from turning. The strip thus constructed affords greater facility for the attachment to it of the staple-hooks by which the rod is connected with the slats than a rod made of metal, the shanks of such staples or hooks being screwed into the wooden filling.

METAL BLIND-SLAT.—William E. Brock, New York City.—*Jan.* 16.—This invention consists in a novel manner of securing the rod whose ends form the tenons or pivots to the slat, whereby greater strength is given the slat, and the rod is more firmly secured thereto.

PAINT-MILL.—John W. Masury, New York City. —*Jan.* 16.—Among the re-issued patents in the last official list is that for the paint-mill of which an illustrated description was published on page 200, Vol. XIII., of the AMERICAN ARTISAN.

IRON BLIND FRAME.—William E. Brock, New York City.—*Jan.* 16.—This invention relates to slatted shutter-blinds of iron for dwelling-houses and other buildings, and it consists in a novel construction of the frame of such a blind, of four rectangular metal tubes, which are fitted throughout the greater portion of their lengths with strips of wood, which add to the strength of the frame, and admit of the attachment thereto of hinges and other appurtenances by screws. The strips of wood within the side-pieces of the frame have a longitudinal groove formed in them, opposite the pivot holes in the tube, to prevent the wood when swelled or contracted by the weather from interfering with the operation of the pivots of the slats. It also consists in a novel construction of the corner joints of the tubular metal frames, whereby great strength is obtained in an inexpensive way.

The Largest Sewing-machine Manufactory in Europe.

From the *Mechanics' Magazine.*

THE sewing-machine manufactory of the Singer Company, in James Street, Bridgeton, is the largest establishment of its kind in Europe, and is only surpassed by two similar manufactories in America. As most of our readers will be aware, the Singer machine is an American invention. For a number of years the machines supplied to this country were all made on the other side of the Atlantic. As the demand increased, however, the Singer Manufacturing Company resolved to open an establishment in the mother country, capable of supplying the whole of Europe, and fixed upon premises in Love Loan, Glasgow, where the trade was carried on until 1867. Larger premises were then acquired in Bridgeton, and these have from time to time been enlarged within the last four years, until they bid fair to equal the parent establishment in New York.

The Bridgeton factory has a frontage of 380 feet, and is 36 feet in depth. There is a supplementary wing, about 65 feet long by 40 feet wide, and a blacksmiths' shop, 70 feet by 30 feet. The machinery is driven by two engines, one of them a horizontal engine of 30 horse-power, 18 inch cylinder, and 3 feet stroke; the other, a condensing beam-engine of 45 horse-power, 31-inch cylinder, and 5 feet stroke. The smaller engine was made by Messrs. A. and P. Steven, of Glasgow; the other, which is much older, was made at the Great Rollox Foundry, in 1835. The engines are supplied by three double-flued horizontal Cornish boilers, one six feet, and the others eight feet in diameter.

The main building consists of five floors. On the ground floor and each of the three upper stories there is an apartment 160 ft. long by 36 ft. wide, in which the different parts of the machines are made. On one of these flats as many as 180 different machines are constantly in operation, while on the other flats the appliances at work vary from 80 to 100 in number. They comprise milling, edging, drilling, tapping, grinding, and cutting machines, with lathes and vises *ad infinitum*. Nothing more interesting than the appearance of these different shops could be conceived. They are one and all arranged in the most orderly and uniform manner, the different machines being distributed in rows, and placed at equal distances from one another.

Perhaps the most peculiar of the many appliances in operation is the universal milling machine, the carriage of which moves and is fed automatically at any angle, while it can be stopped at any required point. The feed arrangement consists of ten of Hook's joints and a sliding bar. On the carriage, centers are arranged in which rimers, drills, and mills can be cut either straight or spiral. The head which holds one center can be raised to any angle, and conical blanks placed in an arbor in it, cut spiraling. A change of gear is furnished, by which any required spiral can be obtained. An index plate is attached to the head, by means of which the article to be cut is divided. Two tables accompany the machine, one showing the changes of gear for spirals, and the other the divisions made by the index plate. The head can be depressed to cut tapering rimers. Long twisted drills can be milled by putting them through the arbor in the head (which is hollow), and holding them by the chuck and opposite centre. The overhead work is arranged for two belts to actuate the main arbor, and consists of one pair of adjustable hangers, a counter-shaft, with cone pulley, one tight and two loose pulleys, iron shipper rod, with belt guides, shipper dog, and stops. There is also a device for graduating the height of the knee to thousandths of an inch, and an apparatus for cutting mills of irregular forms. The counter-shaft makes about 110 revolutions per minute.

There is also a number of screw machines, suitable for making, from bar iron, all kinds of screws and studs in ordinary use. With this machine, one man can make as many screws as, otherwise, from three to five men can produce on as many engine lathes. In the revolving head of the screw machines, die-holders of ingenious construction are used. In threading screws and in tapping it is often desirable to cut the thread up to a shoulder, or to run the tap to a given distance, and this is necessarily a delicate operation, requiring no little expertness to avoid breaking the thread tool or injuring the shoulder of the screw. These die-holders have been invented to remedy this difficulty, which they do most effectually, and they are the subject of a patent.

All the different parts of a sewing-machine (except the frames, which are supplied by Messrs. Ure & Co., of Bonnybridge, near Derry, and the walnut tops, which are brought from Southend, Indiana, where the company have large cabinet works, employing 600 or 700 hands, are made on the premises at Bridgeton. One department is specially set apart for the manufacture of the larger size of machine, suitable for tailors, shoemakers, and heavy work in general. About 130 machines of this kind are turned out weekly. The total weekly production of the Bridgeton factory is about 900 machines, or 46,800 per annum.

The works give employment just now to 700 hands, but additions are in progress which, when completed, will afford employment to about 1,000 hands, and give 25,000 feet additional floor-space. It is estimated that the works will then turn out an average of 1,400 machines per week, and when we state that the cheapest description of the Singer machine costs £6 10s., some idea may be formed of the immense capital that will be turned over in connection with this large establisment.

The most scrupulous care is taken, in passing the various parts of a machine from one department to another, that they contain no flaw or defect, and that they fit the other component parts with perfect accuracy. A staff of inspectors is retained for the purpose of gauging the accuracy and soundness of the different parts, for every one of which one or more gauges are provided, capable of adjusting themselves at different points. There are, for example, 23 separate gauges for the bed-plate alone, 10 more for the arms, 6 for the feet-lever, 5 for the stitch-regulator, 3 for the shuttle-hanger, 4 for the crank, 2 for the universal joint, 8 for the feed-dog, 7 for the shuttle, 5 for the hammer, 4 for the throat or handle-plate, 4 for the cam-wheel, and so on to the minutest part of the machine, including even to the various sizes of screws. In another department they are again examined, adjusted with the greatest nicety and minuteness, and, if the slightest imperfection is detected, they are returned as faulty, and overhauled in the shop where the flaw originated. If, on the other hand, the different parts are found to be properly squared, they are accepted and delivered to the packing department. When we mention that every one in the place is on piece-work, it will at once be apparent how careful and painstaking the workmen must be with such rigid system of supervision.

Sewing-machines in general, and Singer's machines in particular, have now become so thoroughly well-known among all classes of the community, that any description of their different parts would be altogether out of place here. There are, however, several subordinate departments of the Bridgeton factory, sufficiently interesting to merit a passing notice. The blacksmiths' shop, which has only been added to the works within the last two years, is a lofty and spacious erection, containing five air-furnaces, three drop-hammers, several trip-hammers, which make about 800 blows per minute, and other appliances. There is a large fan, by Schule, of Manchester, capable of supplying the blast for 24 fires, and two machines for making dies. In another shop a large staff of workmen are constantly employed in making and repairing the different kinds of tools used, although the greater part of these are imported from the other side of the Atlantic. The bed-plates of the machine are placed in a self-adjusting gig, and are thus drilled straight off, through steel collars in the gig, without any trouble or variation as to the exact spot on which the drill is intended to operate. No less than twenty-two holes are drilled in every bed-plate, and by this arrangement no time is lost in altering or changing the drills. On the fourth floor of the building there are 148 vices ranged in three rows, where the machines are adjusted before being passed to the japanning-room, whence they are finally passed to the erecting and packing department.

In its general features, as well as in detail, this factory exemplifies in a remarkable and interesting manner the ingenious and minute adaptation of mechanical means and appliances to the desired end, by which, both in working and results, mere manual labor is superseded, and a demand for skilled labor is created.

HARDLY POSSIBLE.—It is stated that a Philadelphian has been arrested and held in six hundred dollars bail for stealing an umbrella. If this is true, Philadelphia has inaugurated the new year with a noble reform.

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In making application under the new law of 1870 for a United States Patent for an Invention, the first instalment of the Government fee is $15, which sum—together with fifty cents revenue stamp-tax on the power-of-attorney—*is payable in advance* on applying for the Patent, and $20 additional are due to the Government when the Letters-Patent are allowed. The agency fee charged by Messrs. BROWN, COOMBS & Co. is from $25 upward, according to the labor involved, but in all cases their charges will be as moderate as possible for the preparation of drawings and all necessary documents. This fee is not payable until after the application has been prepared and the case is ready to be sent to Washington, and it includes all necessary services performed by Messrs. BROWN, COOMBS & Co. through their *Branch Office* in Washington, to secure the speedy and certain issue of the Patent.

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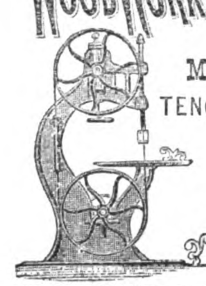

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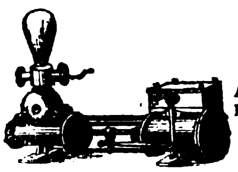

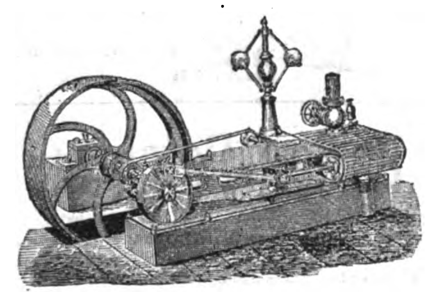

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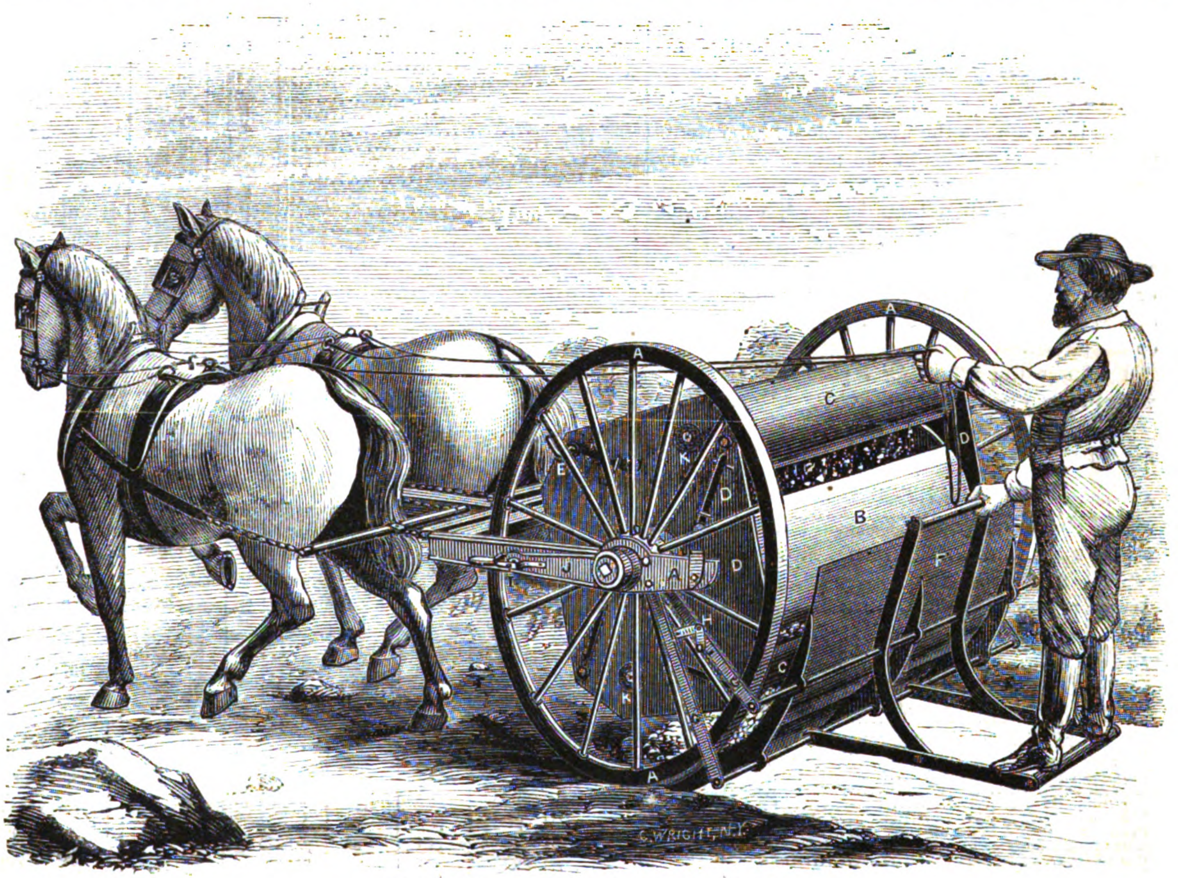
CONTENTS OF THIS NUMBER

[Illustrations are indicated by an asterisk.]

Davis's Patent Excavator.

ON page 283, Vol. XIII., of the AMERICAN ARTISAN, in our notice of the agricultural machinery exhibited at the late Fair of the American Institute, we made brief mention of an excavating machine, recently patented through the "American Artisan Patent Agency," by Mr. R. W. Davis, of Bath, Steuben County, N. Y., and for which Mr. R. G. McDougall, of 93, 95, and 97 Liberty Street, New York City, is the general agent. We now present the accompanying engraving of the apparatus, together with the following sketch, with which we have been furnished, of its construction, mode of use, and advantages over other machines designed for like purposes :—

"A A A combine the wheels and framework of the whole machine, with the axle passing through the center of the cylindrical body, B, into which is being dumped the load of dirt from the rotating elevators, C C, which are secured to the revolving square heads, D D, which revolve on the main axle, carrying the elevator buckets, C C, at their corners, around the body, B, by means of the rule jointed carrier, E, which is seen in the cut so set as to come in contact with one of the spokes of the wheel, A, in such a manner as to cause the heads, D D, with the elevator buckets, C C, to revolve with the wheels, A A, as the machine is drawn forward by the team, while the scraper, F, which is secured to the framework by means of the flexible braces, G G, outside of the wheels, and which is here represented as being dropped down in working position, with the driver standing on the lower cross brace of the projecting arms, and by his weight causing the scraper, F, to scoop up the dirt before it. With one hand he seizes the upper brace or handle, and drives his team with the other; and now, as they move forward, the whole machine is put in motion. (If the ground or material is firm and stiff to handle, it should be plowed up or loosened by some means to the depth of from three to four inches, and the large stone or tough sods removed before commencing operations with the self-loading elevator, C C.) Then, as the scraper, F, raises the material before it, the elevators, C C, supported and rotated by the heads, D D, are turned around by the carrier, E, in contact with the spoke of the wheel, A, in such a manner as to take up the earth from between the scraper, F, and the body of the machine, B, into which the elevators empty themselves, until the cart is loaded with a full cubic yard of earth in a distance of from fifty to a hundred feet from the point of starting, taking less than half a minute to perform the work. The driver now steps off the scraper arms, and lifts it up until the swinging pawls, H H, catch on the back end of the frame, A A, where it rests and is kept clear of the ground, and then continues on his course to the dumping-ground, leaving the carrier, E, to detach itself. When he has reached the dumping-ground, he again adjusts the carrier, E, to the wheel, A, and taking the pin, I, from the hole in the dumping lever, J, and placing it in one of the holes in the heads, D at K, and then, driving ahead again, he dumps his load wherever he wishes."



DAVIS'S PATENT EXCAVATOR.

It is claimed that this apparatus will perform more work than has ever been performed by any other machine invented for grading purposes, and that it will save fifty per cent. over the ordinary method of handling earth; and also that it is adapted to work in any soil where the plow and old-fashioned scraper can be made to operate.

SCRAP DISINTEGRATOR.—A novel apparatus has lately been devised in England for use in process of making washers, insoles, and heels for shoes, from scraps of leather, by reducing the leather to shreds, and before the scraps can be torn they must be formed and so kept in a compact mass, while being acted upon by the tearing teeth. The machine has a feeding-box, a follower or piston, and a set of revolving tearing teeth, at intervals in the direction of their axis of revolution, the combination of parts being such that the teeth tear over the whole exposed surface of the material acted upon. A set of revolving clearers act to clear out the tearing teeth, and a contrivance is used for throwing streams of water upon the teeth

COMMUNICATIONS

TO CORRESPONDENTS.

We wish our readers to understand that, in freely publishing communications, we do not hold ourselves responsible for the opinions of our correspondents, inasmuch as we may occasionally publish views opposed to our own.

Aerial Locomotion.

MESSRS. EDITORS:—Your correspondent, J. S. H., in ARTISAN of Jan. 10, says of aerial locomotion:—"Gravity draws a suspended body to the earth with an initial velocity of 16 feet in the first second of its fall. One horse-power equals lifting up 34⅜ lbs. 16 feet in a second; so that we have 34⅜ lbs. as the weight which one horse-power can keep suspended in air."

Will J. S. H. inform us whether it is 34⅜ lbs. of hydrogen gas, feathers, or lead, that falls 16 feet in a second, and requires just one horse-power to suspend in air? Also, what relation exists between the velocity of a body falling in vacuo and buoyancy in air? His hypothesis is new and plausible, but philosophy seems more reasonable. Will he explain?

SUBSCRIBER.

TENAFLY, N. J., Jan. 18, 1872.

ANNUAL REPORT OF THE COMMISSIONER OF PATENTS FOR THE YEAR 1871.

The Senate and House of Representatives of the United States of America in Congress assembled:—

THE law requires the Commissioner of Patents to lay before Congress, in the month of January annually, a report of all receipts and expenditures; a list of all patents granted, with name and subject-matter indexes, etc.; a list of all patents extended during the preceding year, together with such other information of the condition of the Patent Office as may be useful to Congress or the public.

I submit the following report in compliance with this law:—

1. *Statement of moneys received.*

Amount received on applications for patents, re-issues, extensions, caveats, disclaimers, appeals, and trade-marks	$612,835 00
Amount received for copies of specifications, drawings, and other papers	47,729 80
Amount received for recording assignments	18,151 66
Total	$678,716 46

2. *Statement of moneys expended.*

Amount paid for salaries		$422,316 02
Amount paid for photographing		45,693 30
Amount paid for contigent and miscellaneous expenses, viz.:—		
Advertising	$3,062 00	
Stationery	17,204 41	
Tracings, etc	472 85	
Painting, glazing, varnishing, and glass	3,001 20	
File-boxes	1,215 00	
Furniture, carpeting, etc	10,827 05	
Repairing furniture, carpenter's work, and fitting up cases in model-rooms	16,832 04	
Plumbing and gas-fitting	5,752 59	
English Patents	1,382 23	
Paper-hanging	1,057 49	
Work on report	1,683 00	
Preparing index of assignments	3 0 75	
Refunding money paid by mistake	900 00	
Hardware	3,992 70	
Pay of temporary employees	16,187 60	
Miscellaneous items, viz., books for library, subscription to journals, freight, ice, washing towels, fees of judges in appeal cases, withdrawals, purchase of horse and carriage, and livery	10,131 41	
		94,082 32
		$562,091 64

3. *Statement of the balance in the Treasury of the United States on account of the patent fund.*

Amount to the credit of the patent fund January 1, 1871	$643,355 21
Amount of receipts during the year 1871	678,716 46
Total	$1,322,071 67
From which deduct expenditures for the year 1871	562,091 64
Balance on the 1st of January, 1872	$759,980 03

4. *Statement of the business of the Office for th year* 1871.

Number of applications for patents during the year 1871		19,472
Number of patents issued, including re-issues and designs		13,033
Number of applications for extensions of patents		204
Number of patents extended		158
Number of caveats filed during the year		3,366
Number of patents expired during the year		2,654
Number of patents allowed, but not issued for want of final fee		1,007
Number of applications for registering of trade-marks		505
Number of trade-marks registered		486
Of the patents granted there were to—		
Citizens of the United States	12 511	
Subjects of Great Britain	432	
Subjects of France	30	
Subjects of other foreign governments	60	
		13,033

The patents issued to citizens of the United States were distributed among the citizens of the several States, Territories, etc., as follows:—

(The proportion of patents to population is shown in last column)

STATES, ETC.	No. of Patents	One to each—
Alabama	29	34,400
Arkansas	13	37,300
California	243	2,300
Colorado Territory	15	2,660
Connecticut	667	806
Delaware	46	2,717
District of Columbia	136	970
Florida	10	18,775
Georgia	73	16,220
Idaho Territory	2	7,500
Illinois	871	2,916
Indiana	393	4,277
Iowa	225	5 387
Kansas	40	9,110
Kentucky	125	1,057
Louisiana	95	7,655
Maine	197	3,183
Maryland	240	3,254
Massachusetts	1,386	1,051
Michigan	383	3,091
Minnesota	53	8,302
Mississippi	48	17,333
Missouri	248	6,940
Montana Territory	2	10,300
Nebraska	12	10,250
Nevada	21	2,125
New Hampshire	102	3,121
New Jersey	496	1,827
New Mexico	1	91,874
New York	2,954	1,450
North Carolina	51	21,000
Ohio	905	2,945
Oregon	23	4,000
Pennsylvania	1,542	2,284
Rhode Island	184	1,181
South Carolina	26	27,139
Tennessee	104	12,100
Texas	52	15,742
Vermont	111	3,000
Virginia	108	11,342
Washington Territory	1	23,955
West Virginia	42	10,524
Wisconsin	227	4,646
Wyoming Territory	3	3,036
Persons in the Army and Navy	6	

5. *Comparative Statement of the business of the Office from* 1837 *to* 1871, *inclusive.*

Year.	Applications.	Caveats filed.	Patents issued.	Cash received.	Cash expended.
1837	......	......	435	$29,289 08	$33,506 98
1838	......	......	520	42,123 54	37,402 10
1839	......	......	425	37,260 00	34,543 51
1840	765	228	473	38,056 51	39 020 67
1841	847	312	495	40,413 01	52,666 87
1842	761	391	517	36,505 68	31,241 48
1843	819	315	531	35,315 81	30,776 96
1844	1,045	380	502	42,509 26	36,244 73
1845	1,246	452	502	51,076 14	39,395 65
1846	1,272	418	619	50,264 16	46,158 71
1847	1,531	553	572	63,111 19	41,878 35
1848	1,628	607	660	67,576 69	58,905 84
1849	1,955	595	1,070	80,752 78	77,716 44
1850	2,193	602	995	86,927 05	80,100 95
1851	2,258	760	869	95,738 61	86,916 93
1852	2,639	996	1,020	112,656 34	95,916 91
1853	2,673	901	958	121,527 45	132,869 83
1854	3,324	868	1,902	163,789 84	167,146 32
1855	4,435	906	2,024	216,459 35	179,540 33
1856	4,960	1,024	2,502	192,588 02	199,931 02
1857	4,771	1,010	2,910	196,132 01	211,582 09
1858	5,364	934	3,710	203,716 16	193,193 74
1859	6,225	1,097	4,538	245,942 15	210,278 41
1860	7,653	1,084	4,819	256,352 59	252,820 80
1861	4,643	700	3,340	157,354 44	221,491 91
1862	5,038	824	3,521	215,754 99	182,810 39
1863	6,014	787	4,170	195,593 29	189,414 14
1864	6,932	1,063	5,620	240,919 98	229,868 00
1865	10,664	1,937	6,616	348,791 84	274,199 34
1866	15,269	2,723	9,450	495,665 38	361,724 28
1867	21,276	3,597	13,015	646,581 92	639,263 32
1868	20,420	3,705	13,378	681,565 86	628,679 77
1869	19 271	3,624	13,986	693,145 81	486 430 78
1870	19,171	3,273	13,321	669,456 76	557,149 19
1871	19,472	3,366	13,033	678,716 46	560,595 08

A plate is added showing graphically the business of the office from 1836 to the present time, in such form as to represent to the eye the comparative business of the different years.

The name and subject-matter indexes, giving an alphabetical list of patentees, with their places of residence, are herewith submitted as part of this report.

It will be seen by the statements of receipts and expenditures, that the office has received and placed in the Treasury of the United States during the year $116,624 82 more than its entire expenditure. Of the items of expenditure, $47,885 37 were paid to copyists of drawings, to the photo-lithographers, and for paper for the reproduction of drawings of patents issued prior to July 1, 1869. This is an expenditure not properly chargeable to the current expenses of the office; and would, if added to the balance above stated, make the real excess of receipts over the current expenses for the year $164,510 19.

The reproduction of the past drawings is absolutely necessary to the proper management of the business of the office, and is also a matter of great interest and profit to inventors and manufacturers. When once done, the expense of the work will cease, while the office and the country will for ever reap the benefits resulting from it. I would respectfully recommend that liberal appropriations be made for this work, that it may be completed as soon as possible.

The work of the Patent Office will necessarily increase to some extent, although the number of applications for patents may be substantially the same from year to year. Every application for a patent placed on file becomes a reference on which to reject subsequent applications for patents on the same improvements. Each year adds about twenty thousand to the number of these applications, which necessarily increases the clerical and examining labor of the office.

The joint resolution of January 11, 1871, abolished the old form of annual reports of the Patent Office. This resolution was passed in the belief that there was very little public demand for or interest felt in those reports. This belief, I think, was not well founded. There was a wasteful number of these reports printed, and they were, without doubt, injudiciously distributed. The consequence was that the larger portion of them fell into the hands of persons for whom they were not adapted, and soon found their way to rag-dealers and second-hand book-stores. The demand, however, of inventors, mechanics, manufacturers, and others, for accurate information of what is being done in the Patent Office, is great and increasing. The old annual reports were unsatisfactory for two reasons:—First, because they were always about two years behind date; and, second, because in furnishing necessarily only ill-advised abstracts of the specifications and drawings, they seldom gave full information of what was covered by any patent, and consequently were very often misleading and deceptive.

Those reports, however, with all their defects, were read and studied with great avidity by inventors and mechanics throughout the country; and the perusal of them has, undoubtedly, resulted in giving to the world very many valuable inventions and improvements. Unless a proper substitute is provided, I am of the opinion that their abolition will cause an abatement of interest in improvements and a diminution of the number of inventions. The inventive genius of one is stimulated and encouraged by seeing the results of the ingenuity of others. One man makes an impor-

tant invention and obtains letters-patent therefor. If a correct knowledge of this patent can soon be placed in possession of five hundred other ingenious men, many valuable improvements will be suggested and patented, and the public will obtain a comparatively perfect machine in place of the crude or less perfect production that may have come from the hands of the first inventor. The records of the Patent Office will show that but comparatively few radical inventions have been practical or profitable as first invented. It is only after the first thought has been embodied and presented to the world, and improvements to adapt it to the various uses for which it is calculated have been invented, that it becomes of most profit to the original inventor or most useful to the public. The value and importance of giving promptly a wide circulation to correct information of the character of all inventions and improvements patented can hardly be overestimated.

The object of the patent laws, as expressed in the Constitution, is "to promote useful arts." This is done in part by giving inventors a legal monopoly of their inventions for a limited time; but it is of scarcely less importance that each inventor in the country should be promptly, and at small expense, furnished with a knowledge of what all the others are doing. Without such knowledge no one of them can pursue his investigations intelligently or economically. In any one of the useful arts, a knowledge of the present state of that art—of what others have done in it—is essential and necessary to any person engaged in improving it. To furnish this knowledge, so far as it is made a matter of record by the Government, is clearly within the scope of the end sought by the establishment of the Patent Office.

In abolishing the old form of annual report, which was very unsatisfactory and expensive, it is questionable whether the law has provided an adequate substitute.

The joint resolution of January 11, 1871, provides as follows:—

That the publication of the abstracts of specifications and of the engravings heretofore accompanying the annual report of the Commissioner of Patents be discontinued after the publication of that portion of the report for eighteen hundred and sixty-nine for which the plates have already been prepared; and that, in lieu thereof, the Commissioner be authorized to have printed, for gratuitous distribution, not to exceed one hundred and fifty copies of the complete specifications and drawings of each patent subsequently issued, together with suitable indexes, to be issued from time to time, one copy to be placed for free public inspection in each capitol of every State and Territory; one, for the like purpose, in the clerk's office of the district court of each judicial district of the United States, except when such offices are located in State or Territorial capitols; and one in the Library of Congress, which copies shall be taken and received in all courts as evidence of all matters therein contained, and shall be certified to under the hand of the Commissioner and the seal of the Patent Office, and shall be taken and received in all courts as evidence; said copies not to be taken from said depositories for any other purpose than to be used as evidence; and the Commissioner of Patents is hereby authorized and directed to have printed such additional number of copies of specifications and drawings, certified as hereinbefore provided, at a price not to exceed the contract price for such drawings, for sale as may be warranted by the actual demand for the same; and the Commissioner is also hereby authorized to furnish a complete set of such specifications and drawings to any public library which will pay for binding the same into volumes to correspond with those in the Patent Office, and for the transportation of the same, and which shall also provide proper custody for the same, with convenient access for the public thereto, under such regulations as the Commissioner shall deem reasonable.

By this joint resolution, one copy each of the specifications and drawings of all the patents issued will be placed for free public inspection in the capitol of every State and Territory, and one copy, for like purpose, in the clerk's office of the district court of each judicial district, where said clerk's office is not at the capitol of any State or Territory. This will give only one copy each to most of the States and Territories, two copies each to a few of the States, and three copies each to a still less number. These State and district court libraries are open only during the business hours of the day; and, while they will be very convenient and useful for the courts and for a limited number of attorneys, yet they will prove valueless as far as the great body of mechanics and inventors of the country are concerned. They are, practically "sealed books" to nearly all of the class most interested in them, and whose perusal of them would most benefit the public.

The resolution also provides that these specifications and drawings shall be furnished to such public libraries as will pay for binding and transportation. The binding will cost the Government about one hundred and thirty dollars a year for each library supplied under this resolution. This provision will exclude them from nearly all places except the larger cities. The only remaining provision for giving inventors, mechanics, and others any information of patented inventions is found in the clause that directs the Commissioner to have printed additional copies of specifications and drawings for sale to persons desiring to purchase; and subsequent legislation fixes the minimum price at which the specifications and drawings may be sold at ten cents per copy. This would make a full set, unbound, for one year, cost about thirteen hundred dollars—a sum which would be paid by very few.

Supposing that the larger portion of inventors, mechanics, manufacturers, and others who are interested in the work of the Patent Office would each feel a special interest only in the particular branch of industry in which he is engaged, the Office has caused a classified subject-matter index to be prepare for free distribution. This index classifies the various subjects of inventions under one hundred and seventy-six different heads, according to the departments of industry to which they relate. By consulting this index, persons are enabled to order the complete copies of all specifications and drawings of patents belonging to classes in which they feel special interest. This arrangement has been in operation only since the first of September last, and is not very generally understood. It results, however, in the sale of about one thousand copies per week. The sale would be largely increased by a reduction of the price to five cents per copy, which would pay the cost. I would recommend such reduction to persons subscribing for an entire class. For single copies the price should remain as it is. I would further recommend that, where parties desire to purchase copies of the specifications and drawings of all the patents issued, the Commissioner be authorized to sell them at net cost.

Still there would remain unsupplied a large demand for prompt, brief, and general information, in a compendious form, of all the patents issued, and of all the important decisions and changes affecting the Office practice. To meet this demand, to some extent, the Office is now publishing, under the authority of Section 20 of the Act of July 8, 1870, a weekly *Official Gazette*, in which is given a name index of the patentees and a subject-matter index of all patents issued during the current week; a list of the designs patented, and of the trade-marks registered; a notice of all pending applications for extensions, and of extensions granted; a transcript of the claims of all patents issued; a notice of all disclaimers filed; all important decisions of the Commissioners of Patents; current decisions of the courts in trade-mark and patent causes; all changes in the rules of Office practice; modifications of the patent law; special legislation affecting existing patents, and other official matter of interest to persons having business with the Patent Office. This is as far as the Commissioner feels authorized to go under existing laws. All that seems necessary to enable this *Official Gazette* to supply the entire demand for information still unprovided for is to authorize the Commissioner to add to it a well-considered abstract of the specifications and drawings upon which patents are issued. The subscription price of the *Gazette* has been fixed at five dollars per annum. It is believed that the addition of the abstract of the specifications and drawings will very soon so increase its circulation as to make it entirely self-sustaining without increasing the subscription price. Investigations and experiments are now being made that will very soon enable me to lay before the proper committees the additional cost of such additional work.

[*To be concluded in our next.*]

How did it Happen?

FOR some reason or other, at the recent inauguration of the Franklin Statue in Printing House Square, New York City, none of the orators repeated the lines:—

"'Twas Dr. Franklin caught the horse,
'Twas harnessed by Professor Morse."

On no similar occasion during the past twenty years has an opportunity of spouting this rhyme been neglected, and that such should have been omitted in the present instance is unaccountable.

Engineering in Egypt.

THE staff of engineers sent out by Mr. Fowler, in behalf of the Government of Egypt, to survey and lay out the proposed Soudan Railway, have already commenced operations the whole length of the line between the second Cataract and Khartoom. The staff, which consists of twenty experienced English surveyors, an English surgeon, and numerous native assistants, are all in excellent health, and speak highly of the arrangements of the Egyptian Government in carrying out Mr. Fowler's programme for their progress and work. The highest importance has long been attached to this railway communication in the interests of Egypt. The vast area of rich land above the Sixth Cataract is capable of producing sugar, cotton, grain, etc., to an extent almost unlimited, but the present means of transport are dependent on the employment of camels for several hundred miles, and all exportation, therefore, except of spices and similar products, is simply impossible. It is not improbable that more frequent intelligence from Sir Samuel Baker may be obtained from the facilities afforded by this expedition.—*London Times.*

A Prize for Architects.

THE Minister of Public Works of the German Empire, acting under the authority of the Government, has issued an invitation to the architects of all nations, requesting them to prepare original designs and drawings for the erection of new Houses of Parliament. The drawings are to be completed and laid before the Minister prior to the 15th of April next. A prize equal in value to $4,120 will be awarded to the competitor whose design is accepted.

Dentistry in Japan.

HADSIKFSAN, literally "tooth carpenter," is the name applied to dentists in Japan. Dentistry, to some extent, is practiced as an itinerant business. The carver, taking his seat beside the highway, exhibits his gilded sign, specimens, and material. When not engaged in the all-important business of gossiping, he plies his chisel, shapes a denture, or grinds on a slab a bit of quartz for a tooth. In full practice a dentist may get two or three cases in a month, and, for some, he may receive as high as five dollars; but that is a price far above the ability of the majority to pay; from one to two dollars being the usual rate.

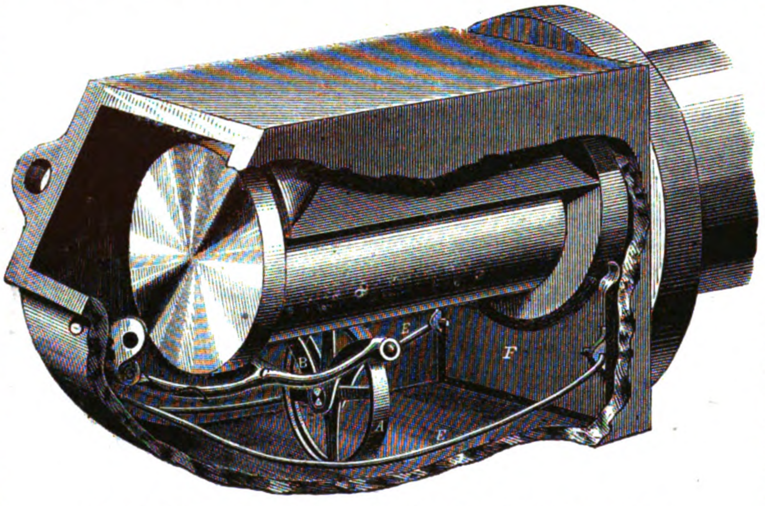
The base is always of wood. On the cheaper sorts, the teeth are merely outlined upon the base, but generally they consist of ivory, shark's teeth, or stone, let into the wood, and retained in position by being strung on a thread, which is secured at each end by a peg driven into the hole where it makes its exit from the base. Iron or copper tacks are driven into the ridge to serve for masticating purposes, the unequal wear of the wood and metal keeping up the desired roughness of surface. To construct a full upper and lower denture requires about two days' constant work. Generally, however, four or five are taken, as there must be time allowed for the usual smokes and occasional naps which are considered so necessary. The ordinary service of a denture is about five years, but they frequently last much longer. The writer has one in his possession that has been in use fifteen years, and is still quite serviceable.

The process of manufacture is crude in the extreme. A piece of wax, large enough to cover the roof of the mouth, is heated, introduced, and pushed up in position by the thumbs; it is then removed, and placed in cold water to harden. Another piece of wax, large enough to make the model, is then heated and applied to the impression, pressed into every part by the fingers, then chilled by placing in cold water, and separated. A piece of wood is now roughly cut to the desired form, and the model, having been smeared over with a red paint (veni), is now applied to the plate; where they touch each other is marked by the paint. This is then cut away, and the process repeated until the plate coats uniformly; it is then tried in the mouth, and any necessary corrections made. They do not seem to be very particular to get a smooth surface, at times not removing the tool-marks.—*Dental Cosmos.*

THE Boone Iron Company's Rail Mill at Chattanooga, Tenn., now use nine of Danks's rotary puddling furnaces. They charge into these furnaces 600 pounds of pig-iron and some scale-iron, and get out from 650 to 700 pounds of iron, weighed after being rolled into "flats." They pay their puddlers $4 10 per tun, each furnishing his helpers, except an extra man for the crane; one crane works for two furnaces. The men make more money than at $7 50 per tun in the old puddling furnaces, and work fewer hours. After work is over, each puddler renews the fix in his furnace. In Cincinnati this is done by a separate workman. It takes about two hours to renew the fix. Hence, by four o'clock the puddler is generally at liberty.

Sanson's Patent Car-axle Lubricator.

ON page 24, current volume of the AMERICAN ARTISAN, we presented an illustrated description of the improved lubricator (patented Jan. 2, 1872, through the "American Artisan Patent Agency") invented by Mr. John S. Sanson, and now being introduced by Mr. Charles Mettam, 395 Canal Street, New York City, to whom an interest has been assigned. The sketch above referred to was complete as far as it went, but included only the mechanical construction of the device. As the parties interested desire to point out more in detail the advantages arising from the arrangements of its parts and the results obtained from its use in actual practice, we reproduce the engraving, and give the statement appended below. It will be seen that, in the working of the device, the oil placed in the bottom of the box is carried up to the axle by a wheel, A, arranged below and in contact with the axle, and with its lower edge dipping into the lubricant. The wheel, A, has its pivot in stirrup-pieces, B, which have pivotal connection with the forked end of a lever arm, C, swinging on a fulcrum at the end of the box, and pressed upward by a spring to keep the wheel in constant and elastic contact with the axle. To prevent the spread of the oil from the axle at the inner end of the box, a pad-block, F, is pressed up by a spring, E, against the usual annular flanch on the axle. By this construction of the apparatus it can be applied to axle-boxes of ordinary construction without necessitating the slightest change in the boxes; the method of attaching the wheel, A, to its bearings, permitting it to turn and be moved to its place through the outer end of the box. The attachment of the pivotal or fulcrum bearing of the lever-arm, C, to the end of the box is very readily accomplished by the aid of a drill-stock and a couple of rivets or small bolts. It is evident, therefore, that the time required for applying the lubricator to the axle-boxes of a train is so slight as to cause practically no delay in its use, and no parts are in danger of being jarred out of place or injured in the ordinary exigencies of railway usage.



SANSON'S PATENT CAR-AXLE LUBRICATOR.

The trials of this improvement have given notable results, which, with the incidental savings in the matter of oil, packing, etc., are set forth in letters addressed to the owners of the invention, by railway men connected with the Central Railway of New Jersey, some of which letters are given below as follows:—

J. S. SANSON:—

DEAR SIR:—In answer to your inquiry, we are pleased to say our record shows No. 33 engine, to which the car is attached using your arrangement, to have run 4,400 miles with one pint of oil supplied to the journal having your rotary oil-feeder. Yours

C. D. CULVER,
Foreman Coal, Post Shops, Coal Cars.
JOSIAH POE,
Engineer, 33 Engine.

MAUCH CHUCK, PA., Dec. 30, 1871.

Mr. Culver, in another letter of even date with the one just quoted, further says:—"I find it [the Sanson oil-feeder] reliable in every respect, and hope to see it soon in general use. As it requires no packing, it gives us no trouble. From accounts kept, it uses but one-third the oil compared with the packed box, besides saving the cost of wool-waste and the time required in putting it in. With your oil-feeder [Sanson's], one-fourth the number of men now employed could do the oiling. Therefore I have no hesitation in saying that a great saving to railroad companies can be effected by its use, not only through its economical action, but through its certainty of operation, which will prevent the many expensive delays and disasters caused by heated axle-bearings."

A LARGE COTTON STALK.—Mr. J. Applewhite, of Magnolia, Miss., sends a stalk of cotton to his factory in that city, and, in his letter in reference thereto, he says:—It had about 300 matured bolls, and made fully three pounds of cotton in the seed. He thinks it would be an easy matter to raise an acre of such cotton "by planting in hills four feet each way, on land well prepared by sub-soiling, and manuring. An acre planted thus would contain 2,700 stalks, which, yielding, say two pounds seed cotton each—a moderate estimate—would make four bales of 400 pounds each, worth, at present prices, $300 net."—*Prairie Farmer.*

SQUIRREL HUNTING.—The farmers of Contra Costa County, Cal., have formally approved the principles of a bill which requires every landowner in the county to exterminate the squirrels on his land, and, in case of his failure to do so, authorizes a public officer to attend to the matter, the expense to be a lein on his land, and to be collected in the same manner as taxes. Gopher traps will, doubtless, be at a premium.

DURING the past twelve months, the life-boats of the English National Lifeboat Institution rescued 658 lives, in addition to 31 vessels saved from destruction. During the same period the Lifeboat Institution granted rewards for saving 230 lives by fishing and other boats, making a grand total of 888 lives saved last year mainly through its instrumentality.

IRON SHIPS.—In one ship-building establishment in Philadelphia there are five first-class iron steamships in process of construction, with an aggregate tunnage of 13,000 tuns, which will require for their construction 16,000,000 pounds of iron, and the ships when completed will cost $2,500,000.

AN umbrella frame in process of manufacture has to pass through more than one hundred hands and is the result of remarkably delicate and ingenious manipulations.

Glycerine Blacking.

Herr Artus describes a combination of gutta-percha, olive-oil, and glycerine, which, he states, possesses the advantage of rendering leather more waterproof, at the same time making it more supple, and increasing its durability. He takes 3 or 4 kilogrammes of vegetable black, ½ kilo. ivory black, and mixes them thoroughly with 5 kilos. molasses and 5 kilos. glycerine until they are perfectly incorporated. He next melts very gently 150 grammes of gutta-percha previously cut into small pieces, and, when perfectly fluid, adds to it 600 grammes of hot olive-oil, and subsequently 60 grammes of stearine. This mixture, while still hot, is added to the first and thoroughly stirred, after which 300 grammes of Senegal gum, dissolved in 1½ kilos. of water, are added. When required for use, this blacking must be diluted with 3 or 4 parts of water. It gives a very brilliant surface to leather.

Croton Chloral.

Dr. Oscar Liebreich, of Berlin, to whom we owe that invaluable therapeutic agent, hydrate of chloral, has lately been investigating the physiological properties of a new organic compound, which is formed by the action of chlorine upon allylene, viz., croton chloral. When administered to animals, a peculiar effect is produced, the head being to a great extent rendered insensible to feeling, while the rest of the body remains comparatively sensible. If the inhalation is prolonged, the spinal cord loses its function, and reflex excitability is everywhere extinguished. During that stage, both pulse and respiration remain unchanged. The third stage, which is induced by large doses, is characterized by paralysis of the medulla oblongata and death. Animals may, however, be kept alive by artificial respiration, because the action of the heart is not interfered with, while the ultimate effect of hydrate of chlorai is to paralyze the heart. Croton chloral, therefore, promises to produce all the good effects of hydrate of chloral, without any drawback being attached to its judicious use.—*Mechanics' Magazine.*

Artificial Ivory for Billiard Balls.—It is said that billiard balls are now made, both for American and foreign trade, which are claimed to be more durable than those of true ivory. These balls are composed principally of gun cotton, reduced to a fine pulp and molded. The other ingredients are as yet a secret, which the makers do not desire to make public. After molding, the ball is put in a press, and reduced about one-third in bulk. It is then put away to be dried. When partially dry, it is put into a bowl of quicksilver to test the uniformity of its center of gravity. If not true in its balance, it is thrown aside; if true, it is again pressed, and again put on the shelf to be thoroughly dried before it is taken to the turner and the polisher. Three months elapse from the day of molding till the time when a ball is ready to be sent to purchasers. The balls cost about one-half the price ordinarily charged for ivory balls.

Union torpedoes are rather too demonstrative to furnish pleasant chewing. A boy in Chillicothe, Ohio, picked up one in the street recently, and put it into his mouth. After rolling it about with his tongue, he bit it gently, and was astounded by an explosion which demolished his cheek and nearly blew the top of his head off.

Huers of wood—house painters.

Explosion of the Boiler of a Traction Engine.

The boiler of a traction engine exploded at Glasgow, on Saturday, Dec. 30, causing the death of seven persons, and injury to others. The engine had been dragging heavy machinery from Elder's shipbuilding yard, Govan, and was coming back empty. Being a novelty, it was followed by a crowd of boys and adults. Suddenly, when near Kingston Dock, the boiler of the locomotive burst. The boiler was blown out, and shot into the air, falling through the roof of an eating-house. The solid frame of the locomotive still stood, but all above had been torn completely into fragments. Through the roof of the eating-house protruded the black shell of the boiler, just as it fell after being driven through the air. The boiler was built seven years ago, and was subsequently converted from a vertical multitubular into a dome boiler with two cast tubes.—*The Engineer.*

Transparent Lacs.

It is said that the aniline colors are particularly well adapted for the manufacture of transparent lacs, which possess great intensity even in very thin films, and are hence very suitable for coloring glass or mica. The process recommended is to prepare separately an alcoholic solution of bleached shellac, or sandarach, and a concentrated alcoholic solution of the coloring matter, which last is added to the lac before using it, the glass or mica to be coated being slightly warmed. Coloring films of great beauty may also be obtained from colored solutions of gun-cotton in ether, the coloring matter being here dissolved in alcohol and ether. The collodion film has its elasticity greatly increased by the addition of turpentine, and when applied cold, can be removed entire. The colored films may then be cut into any pattern, and again attached to transparent objects.

A Swift Steam Launch.—An express steam launch, designed and built by Thorneycroft, of Chiswick, for the use of Mr. J. Fowler, C.E., on the river Nile, made trials of speed a few days ago, over a measured mile between Chiswick and Barnes. With the tide her speed was 22·78 miles per hour; against the tide her rate was 16·66 miles. Thus the mean speed was 19·72 miles. This is more than twice the speed of an ordinary steam launch, and, indeed, probably faster than the swiftest in Her Majesty's Navy. Seeing that such a prodigious pace has been attained by a boat easily slung on davits, it seems probable that such craft will find a function in any future war.—*English Paper.*

International Exhibition of Agricultural Implements, Machinery, etc.— The Dutch Agricultural Society propose to hold an International Exhibition of Agricultural Implements, Machinery, etc., at The Hague, in the week from 21st to the 30th Sept., 1872, in celebration of their 25th anniversary. Intending exhibitors are requested to furnish full particulars before the 15th August next, to the secretary, P. F. L. Waldeck, Esq., Loosduinen, near The Hague, from whom every information can be obtained. The prize list is a long one.

The late Charles Babbage, the eminent mathematician, died worth about £200,000, and bequeathed to his son Henry, for his own absolute use and disposal, his calculating machines, and the machinery, tool-models, and drawings of every kind relating thereto, and all the contents and materials of his work-rooms.

Simple Disinfectants.

As a simple method of employing carbolic acid, C. Homburg, of Berlin, proposes to saturate sheets of coarse millboard with the disinfectant in question. The sheets may be hung up in the rooms requiring purification, or a small piece may be torn off when a small quantity only of carbolic acid is wanted. Sheets of millboard, having an area of about seven square feet, and containing about one-fifth of a pound of carbolic acid, are sold in Berlin for a shilling a piece. Dr. Hager gives the composition of a disinfecting paste for use as washing powder. It consists of 100 parts of white clay, 1,000 parts of distilled water, and 35 parts of ordinary nitric acid. The mass thus obtained is allowed to stand for a few days, being stirred frequently. The supernatant fluid is then to be poured off, and the clayey mass thoroughly washed with distilled water. Five parts of permanganate of potash are now to be added, and the composition, when dried, is made up into tablets, and wrapped in paper saturated with paraffine.

An Ancient Rose-bush.—It is believed that the oldest rosebush in the world is one which is trained upon one side of the Cathedral in Hildesheim in Germany. The root is buried under the crypt below the choir. The stem is a foot thick, and half a dozen branches nearly cover the eastern side of the church, bearing countless flowers in summer. Its age is unknown, but documents exist that prove that the Bishop Hezilo, nearly a thousand years ago, protected it by a stone roof, which is still extant.

The Pacific Coast Wrecking Company are about to dispatch a steamer to the coast of Ecuador, with diving and hydraulic apparatus, the same as used in recovering treasure from the wreck of the *Golden Gate*, to recover the treasure sunk in the frigate *Leocadia*, in the year 1802. Another expedition in search of pirate treasures sails for Cocos Island on the 24th inst. We suppose they will send an expedition to the English Channel next to "fish up" the remnants of the *Alabama* and the Spanish Armada.

The Vendome Column.—It is expected that the Colonne Vendôme will shortly be restored to its former position. All the fragments of the column have been collected at the depot of Crown Property in the Rue de l'Université. There are in all 272 pieces, only two of which will require re-casting—those which formed that portion immediately beneath the capital, representing in relief the soldiers who fought at Austerlitz.

An Old Mold Candle.—E. Peacock, F.S.A., has exhibited to the British Antiquarian Society a small candle of brownish wax with a cotton wick, the surface indented in longitudinal grooves, which has been preserved in his family from the times prior to the Reformation. The special interest it possesses is derived from its having been made in a mold, thus proving that candles were, from an early period, cast as well as dipped.

The King of Dahomey is reported to have changed the fashion of his wearing apparel. He received the Italian Scientific Commission, not long ago, seated on his throne, his body profusely decorated with the druggists' labels, blue, gold, and green, which had been carefully peeled from the medicine bottles brought by Europeans to his country.

The shaft on the Gould & Curry mine, in the Comstock Lode, is down 1,500 feet—the deepest one on the continent.

OFFICIAL LIST OF PATENTS

ISSUED FROM THE UNITED STATES PATENT OFFICE

For the Week ending January 23, 1872,

AND EACH BEARING THAT DATE.

[Reported officially for the "American Artisan."]

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We also furnish a printed copy of the whole specification of any patent issued since November 20, 1866, for - - $1 25
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Whenever asked, we will promptly send, gratis, our recently published pamphlet, entitled "IMPORTANT INFORMATION FOR INVENTORS AND PATENTEES," *containing details of the proceedings necessary to be taken by inventors desirous of obtaining Letters-Patent in the United States. Also, Instructions to Patentees concerning Re-issues, Extensions, Infringements, Foreign Patents, etc.*

Address BROWN, COOMBS & Co., *Solicitors of American and Foreign Patents,* 189 *Broadway, New York.*

122,877.—COTTON-SEED MILL.—Israel F. Brown, New London, Conn.

122,878.—APPARATUS FOR EXPRESSING THE JUICE FROM APPLES, ETC.—George R. Burt, Perry, N. Y.

122,879.—MUSICAL PITCH-PIPE.—William H. Clarke, Dayton, Ohio.

122,880.—MANUFACTURE OF CEMENT AND ARTIFICIAL STONE.—Gilbert S. Dean, San Francisco, Cal.

122,881.—MANUFACTURE OF SHOVELS.—Charles Ellis, Canton, and Oliver Ames, 2d, North Easton, Mass.

122,882.—COAL-SCREEN.—Benneville L. Fetherolf, Borough of Tamaqua, Pa.

122,883.—BURGLAR-PROOF SAFE.—Daniel Fitzgerald, New York City.

122,884.—STEAM AND AIR CAR-BRAKE.—John W. Gardner, Cleveland, Ohio.

122,885.—PLOW.—Nicholas Z. Glenn, Watkinsville, Ga.

122,886.—LAMP-HOLDER AND SHADE.—William H. Hawkins, assignor to himself, W. H. Lawrence, and E. E. Hawkins, Cleveland, Ohio.

122,887.—LAMP-POST.—Eugene A. Heath, New York City.

122,888.—RESERVOIR COOKING-STOVE.—Levi Hermance, Lansingburg, N. Y. Ante-dated Jan. 12, 1872.

122,889.—EGG-CARRIER.—Edward P. Herrick, Chicago, Ill.

122,890.—BRACKET-HOOK FOR SHOW-WINDOWS.—Joseph Hodgkins, Harrisburg, Pa.

122,891.—WASH-BOILER.—George A. Hynds, Rome, N. Y.

122,892.—HARVESTER-DROPPER.—John W. Irwin, assignor of one-half his right to Andrew J. Haswell, Charles E. Wright, and Palmer C. Smith, Circleville, Ohio.

122,893.—MACHINE FOR MAKING HORSESHOES.—William R. Justus, assignor to Shoenberger & Co., Pittsburg, Pa.

122,894.—APPARATUS FOR EXHAUSTING GAS FROM RETORTS, ETC.—Joshua Kidd, New York City.

122,895.—METHOD OF LIGHTING, HEATING, AND EXTINGUISHING FIRES.—Joshua Kidd, New York City.

122,896.—HORSE-POWER.—John A. Lamphier, assignor to himself, Luzene Van Deventer, and Jacob Van Deventer, Dresden, N. Y.

122,897.—MANUFACTURE OF GRUBBING-HOES AND PICKS.—Joseph Lee, Cleveland, Ohio.

122,898.—JOURNAL-BEARING.—James H. Lindsay, Alleghany, Pa. Ante-dated Jan. 19, 1872.

122,899.—CUFF AND COLLAR BUTTON.—Halsted W. Little, assignor to himself and Charles H. Russey, Muncie, Ind.

122,900.—DEVICE FOR LOCKING NUTS.—Kellogg H. Loomis, New York City.

122,901.—ALLOY TO IMITATE SILVER, ETC.—Helen L. Macker, Boston, Mass.

122,902.—DOUGH-KNEADER.—Ebenezer Mathers, Harrisville, West Va.

122,903.—TOOL FOR TWISTING WIRE FOR WIRE GUARDS.—John McMurray, Brooklyn, N. Y. Ante-dated Dec. 30, 1871.

122,904.—VULCANIZED RUBBER PENCIL-MARK ERASER.—Telle H. Müller, Yonkers, N. Y.

122,905.—HAND-SCREW.—Abiel O'dell, Toronto, Canada.

122,906.—SPRING BED-BOTTOM.—Harrison Ogborn, Richmond, Ind., and Andrew W. Kendrick, Brooklyn, N. Y.

122,907.—BALE-TIE.—William Parsons, Palmyra, N. Y.

122,908.—FIRE-BRICK AND STOVE-LINING.—Dan Perry, West Mansfield, Mass.

122,909.—INKSTAND.—James S. Rankin, Minneapolis, Minn.

122,910.—TREADLE FOR SEWING-MACHINES.—Theron A. Richards, assignor of one-half his right to Benjamin H. Hadley, Brooklyn, N. Y.

122,911.—HARROW.—Henry W. Robinson, Woodstock, Ill.

122,912.—MANUFACTURE OF SHEET-IRON.—William Rogers, Apollo, assignor to himself and Thomas J. Burchfield, Alleghany, Pa.

122,913.—METHOD OF PROTECTING SAFES, ETC., FROM BURGLARS.—Calvin C. Rowell and William Duncan, Lebanon, N. H.

122,914.—AUTOMATIC FEEDING APPARATUS.—Robert B. Rugles, Hartford, Conn.

122,915.—SUSPENDER.—Adolphe Salmon, New York City.

122,916.—RATCHET-WRENCH.—Rufus S. Sanborn, Rockford, Ill.

122,917.—GALVANIC TRUSS.—Moritz Schuppert, New Orleans, La.

122,918.—WASHING MACHINE.—Jerome Scott, Charleston, Pa.

122,919.—BOX.—Henry S. Shepardson, assignor to S. N. Whitney, Shelburne Falls, and Charles S. Guilford, Buckland, Mass.

122,920.—EXPANDING MANDREL.—John P. Simons, Houston, Texas.

122,921.—MACHINE FOR FACING THE ENDS OF TUBES AND HOLLOW CYLINDERS.—Nathan P. Stevens, Hopkinton, N. H.

122,922.—STOVE-PIPE SUPPORTER.—Richard Street, Albany, N. Y. Ante-dated Jan. 20, 1872.

122,923.—PISTON-PACKING.—Joseph H. Strehli, Cincinnati, Ohio.

122,924.—RAILWAY SIGNALS.—Daniel F. Sweet, Otsego, Mich.

122,925.—WATERPROOF COMPOSITION SHANKS FOR BOOTS AND SHOES.—William H. Towers, Boston, Mass.

122,926.—CROQUET-BALL FROM RUBBER.—John H. Tuttle, East Hampton, Mass.

122,927.—MACHINE FOR PUTTING NUTS ON BOLTS.—Benjamin L. Walker, Sing Sing, N. Y. Ante-dated Jan. 5, 1872.

122,928.—RAILWAY-CAR COUPLING.—Adam Wellshmidt, assignor to himself and Anton F. Waldbillig, Albany, N. Y.

122,929.—MACHINE FOR FILING SAWS.—Simon K. Wilsey, Kirkwood, Riverside P. O., N. Y.

122,930.—COMBINED TIDAL MOTOR AND AIR-CONDENSER.—John B. Atwater, Geneva, Ill.

122,931.—LANTERN.—Charles S. S. Baron, Bellaire, Ohio.

122,932.—BELT-TIGHTENER.—Josiah W. Batcheller, Oregon, Mo.

122,933.—INDIA-RUBBER BINDING FOR MATTING.—Frederick S. Beardsley, Bridgeport, Conn.

122,934.—PARING-KNIFE.—John H. Bruen, Elmira, N. Y.

122,935.—LAYING SHINGLES.—Sherman G. Castor, Orwell, N. Y.

122,936.—PRESERVING SUGAR-CANE.—Francois C. Darby, Attakapas, La.

122,937.—CONSTRUCTING BUILDINGS.—Andrew Derrom, Paterson, N. J.

122,938.—APPLYING PLASTER TO WALLS AND CEILINGS.—Andrew Derrom, Paterson, N. J.

122,939.—SASH-HOLDER.—Charles H. Eccleston, Oxford, N. Y.

122,940.—WATCH-CHAIN FASTENER.—William C. Edge, Newark, N. J.

122,941.—SAUSAGE-FILLER.—Jacob Edson and William Gibson Bell, Boston, Mass.

122,942.—SAFETY WATCH-POCKET.—Herman Fritsche, Newark, N. J.

122,943.—BELT-TIGHTENER.—Louis Funke, Champion Mills, near Belen Territory of New Mexico.

122,944.—ELECTRO-MAGNETIC ENGINE.—Claude Victor Goume, Williamsburg, N. Y.

122,945.—MACHINE FOR POLISHING AND VARNISHING MOLDINGS.—Charles Gschwind and John Gschwind, Union Hill, N. J.

122,946.—EXTENSION TABLE.—George H. Henkel, Germantown, Ohio.

122,947.—FENCE POST.—William D. Hopgood, Henderson, Ky.

122,948.—BOOT AND SHOE.—J. Morrison Hunter, New York City. Ante-dated Jan. 13, 1872.

122,949.—PAINT FOR SHIPS' BOTTOMS AND OTHER PURPOSES.—William Jesty, Gosport, England.

122,950.—EJECTOR FOR ARTESIAN WELLS.—Murdick Lytle, Oil City, Pa.

122,951.—MARBLE-POLISHING MACHINE.—Michael Mallon, Rahway, N. J.

122,952.—IRON TELEGRAPH-POLE.—Richard D. McDonald, Jersey City, N. J., and Edward M. Crandal, Marshalltown, Iowa, assignors to Richard D. McDonald.

122,953.—GOPHER-TRAP.—William W. McKay, Franklinville, Iowa.

122,954.—TELLURIAN.—George Shotter McKenzie, New York City, assignor to William J. Gordon, Cleveland, Ohio.

122,955.—CIGAR MACHINE.—Fredric C. Miller, Cincinnati, Ohio.

122,956.—PLOW.—Richard J. Miller, Sherman, Iowa.

122,957.—BOOK-SUPPORT.—David E. Morgan, assignor of one-half his right to Wilmot V. White, Cincinnati, Ohio.

122,958.—MACHINE FOR SLITTING SHOE-BINDINGS.—Charles E. Morrill, Deering, Me.

122,959.—AIR-BLOWER.—James W. Newcomb, New York City.

122,960.—COMBINED POCKET-KNIFE AND ENVELOPE OPENER.—Aaron S. Pennington, Paterson, N. J.

122,961.—TELEGRAPH INSULATOR.—Chester H. Pond, Cleveland, Ohio.

122,962.—INSULATING COMPOUND FOR TELEGRAPHS, ETC.—Chester H. Pond, Cleveland, Ohio.

122,963.—THILL-COUPLING.—J. Cugnier Racine, assignor to himself and M. H. Lyon, Appleton, Wis.

122,964.—WATCH.—Christian Reinhardt, New Haven, Conn.

122,965.—BOOK-BINDING.—Ira Reynolds, assignor to Reynolds & Reynolds, Dayton, Ohio.

122,966.—DEVICE FOR MOVING PIANOS.—Samuel D. Reynolds, Rochelle, Ill.

122,967.—FEED-RACK.—James Robinson, Carmel, Me.

122,968.—CORN-SHELLER TEETH.—Herman H. Rueter, New Hope, Mo.

122,969.—CAP FOR BOOTS AND SHOES.—Benjamin F. Sage, Beverly, N. J.

122,970.—LOW-WATER ALARM FOR STEAM-BOILERS.—Linus Savage, Ashtabula, Ohio.

122,971.—STEAM-BOILER FLUE.—John M. Schramm, Pontoosuc, Ill.

122,972.—HORSE-SHOE.—Silas Sloat, Morgan, Ohio.

122,973.—GATE.—Garret S. Spragg and Gilbert Mott, Tabor, Iowa.

122,974.—THILL-COUPLING.—Clement St. James, Pittsfield, Mass.

122,975.—MEDICAL COMPOUND OR BITTERS.—Richard G. Turner, Columbia, Tex.

122,976.—LOOM.—James Wade, assignor to The Parks & Wade Carpet Company, Palmer, Mass.

122,977.—CONCEALED HINGE FOR CARRIAGE-DOORS.—Edward Wells, New Haven, Conn.

122,978.—CHURN.—Thomas J. Wilson, New Lisbon, Ind.

122,979.—REED-ORGAN.—George Woods, Cambridgeport, Mass.

122,980.—HAND-PLANTER.—Young F. Wright, Hannahatchee, Ga.

122,981.—STEAM-ENGINE.—Henry W. Adams, Philadelphia, Pa.

122,982.—LUBRICATOR FOR STEAM-ENGINES.—Almon N. Allen and Rodney H. Dewey, Pittsfield, Mass.

122,983.—COTTON-PRESS.—William C. Banks, Como Depot, Miss.

122,984.—FRUIT-BASKET.—Roland S. Bartlett, assignor to Williams Manufacturing Company, Northampton, Mass.

122,985.—BOOT AND SHOE NAILING MACHINE.—Lyman R. Blake, Fort Wayne, Ind., and Asa S. Libby, Lawrence, Mass.

122,986.—GRAIN-DRILL.—Amos Ray Blood and Benjamin Uhrich, Independence, Iowa.

122,987.—ANIMAL-POWER.—Henry Bolton, Elizabethtown, Canada.

122,988.—SHIRT-STUD.—Ernst Bredt, New York City. Ante-dated Jan. 12, 1872.

122,989.—HORSE-POWER.—Nathaniel B. Brown, Antwerp, N. Y.

122,990.—BEE-HIVE.—Benjamin Franklin Bucklin, Cuyahoga Falls, Ohio.

122,991.—PADLOCK.—Samuel W. Budd, assignor to himself and Henry Budd, Philadelphia, Pa.

122,992.—WHIFFLETREE.—George G. Burgess, Rawsonville, Ohio. Ante-dated Jan. 17, 1872.

122,993.—HEATING-STOVE.—John C. Chapman, Waltham, Mass.

122,994.—BAGGAGE-CHECK.—Lute O. Cotile, assignor of two-thirds his right to David Wormley and George L. Stearns, Cedar Rapids, Iowa.

122,995.—PORTABLE OILER.—Gabriel W. Crossley, Cleveland, Ohio.

122,996.—DASH-BOARD FOR CARRIAGES.—John Curtis, Cincinnati, Ohio.

122,997.—EGG-BEATER.—John Dane, Jun., Newark, N. J., assignor to himself and George W. Ketcham, New York City.

122,998.—CHILDREN'S CARRIAGE.—Charles W. F. Dare, New York City.

122,999.—DEVICE FOR LOCKING NUTS.—Augustus P. Davis, Philadelphia, Pa.

123,000.—HAND FLOUR-SACK PACKER.—John Detweiler, West Liberty, Ohio.

123,001.—GAME-BOARD.—Herman C. Drexel, Baltimore, Md., assignor to himself and John A. Griffin, Philadelphia, Pa.

123,002.—CONSTRUCTION OF SUBAQUEOUS FOUNDATIONS.—James B. Eads, St. Louis, Mo.

123,003.—CAR-BRAKE.—William Ebbitt, New York City.

123,004.—CHOPPING MACHINE.—John Adam Eberly, assignor to himself and Abraham Godshalk, Reamstown, Pa.

123,005.—TELEGRAPH APPARATUS.—Thomas A. Edison, Newark, N. J., assignor to the Gold and Stock Telegraph Company, New York City.

123,006.—PRINTING TELEGRAPH.—Thomas A. Edison, Newark, N. J., assignor to the Gold and Stock Telegraph Company, New York City.

123,007.—HORSESHOE.—William L. Edwards, Ellison, Ill.

123,008.—HAND MIRROR.—Alanson C. Estabrook, assignor to Florence Manufacturing Company, Northampton, Mass.

123,009.—PRESERVING WOOD.—Hiram W. Fawcett, Titusville, and Thomson McGowan, Meredith, Pa.

123,010.—LIFTING-JACK.—Emery R. Gard, Chicago, Ill.

123,011.—PREPARING TOBACCO.—Eben Goodwin, New York City.

123,012.—FEED-TROUGH.—Giles M. Goss, assignor to himself and Ephraim H. Watson, Bloomfield, Iowa.

123,013.—PAPER-BAG MACHINE.—George Guild, assignor to himself and James Gillies, St. Louis, Mo.

123,014.—MACHINE FOR MAKING CIGARS.—Henry J. Hall, Brookline, Mass.

123,015.—TRUCK FOR LOADING WAGONS.—John W. Harmount, Chicago, Ill.

123,016.—MATERIAL FOR FILLING MATTRESSES.—Barzilla Harrington, China, Maine, assignor to himself, Levi H. Straw, and Jesse A. Locke, Boston, Mass.

123,017.—MACHINE FOR FORMING FRINGE ON TEXTILE FABRICS.—Thomas Henderson, Glasgow, North Britain.

123,018.—FURNACE GRATE-BAR.—Carl Hoffman, New York City.

123,019.—ROTARY WASHING AND SCOURING MACHINE.—Jason F. Holmes, Providence, R. I.

123,020.—RUBBER ELASTIC VARNISH.—Gilman Hook, assignor to himself and Sullivan W. Rogers, Harwich, Mass.

123,021.—ROLL FOR SPLITTING RAILWAY-RAILS.—Aquila Howells, Newburg, assignor to Cleveland Rolling-mill Company, Cleveland, Ohio.

123,022.—GASALIER EXTENSION APPARATUS.—Liverus Hull, Charlestown, Mass.

123,023.—CUT-OFF FOR HARVESTERS.—William R. G. Humphrey, assignor to Artemus N. Smith, Chillicothe, Mo.

123,024.—LUBRICATING JOURNALS.—Friedrik Keifel, Cincinnati, Ohio.

123,025.—HARROW.—John Kinhart, Athens, Ill.

123,026.—EMBOSSING PRESS.—Albert Komp, New York City.

123,027.—DEVICE FOR SUPPORTING DRAWERS.—Charles F. Langford, Brooklyn, N. Y.

123,028.—WINE AND WATER COOLER.—David O. Laws, Baltimore, Md. Ante-dated Jan. 8, 1872.

123,029.—MULE FOR SPINNING.—William Lees, Coatesville, Pa.

123,030.—WHEEL-HUB.—Otis B. Little, Wheeling, West Va.

123,031.—STOP-COCK.—John Maclaren, Scranton, Pa.

123,032.—STEP-LADDER.—Peter Martin, Newark, N. J.

123,033.—CAR-BRAKE.—James McCabe, Rondout, N. Y.

123,034.—SASH-HOLDER.—George M. McConnel, Jacksonville, Ill.

123,035.—BLAST-FURNACE.—James H. McKernan, Indianapolis, Ind.

123,036.—BED-SPRING.—Philo C. Morhous, Hanniba', Mo.

123,037.—LOOM.—William Murkland and John W. Murkland, Lowell, Mass.

123,038.—THREAD-TENSION DEVICE FOR SEWING-MACHINES.—Henry R. Newcomb, Florence, Ala. Ante-dated Jan. 8, 1872.

123,039.—CANAL-BOAT.—William Henry Newell, Jersey City, N. J.

123,040.—WRENCH.—Philip Nichols, Troy, N. Y.

123,041.—WASHING MACHINE.—Daniel W. Norris, assignor to Michael Neill, Normal, Ill.

123,042.—COMBINED MECHANICAL MOVEMENT AND GAS-BURNER.—Elhanan Omensetter, assignor to himself and Frederick Gutekunst, Philadelphia, Pa.

123,043.—BRAKE FOR SEWING-MACHINES.—Noyes F. Palmer, Brooklyn, N. Y.

123,044.—WASH-BOILER.—Thomas U. Parker, Mifflintown, Pa.

123,045.—WRITING-TABLET.—Lyman Pettigrew, Gardiner, Maine.

123,046.—BED-BOTTOM.—John H. Power, Burlington, Iowa.

123,047.—GAS-BURNER.—Peter Reitmeier, Chicago, Ill.

123,048.—SHINGLE MACHINE.—John Henry Rice, Oshkosh, Wis.

123,049.—UNIVERSAL-JOINT COUPLING.—Charles F. Roper and Henry Fisher, Canton, Ohio. Ante-dated Jan. 8, 1872.

123,050.—Tobacco-cutter.—Theodore Schug and Cyrus B. Alsover, Easton, Pa.

123,051.—Clothes-drier.—Charles C. Sheldon, Randolph, N. Y.

123,052.—Manufacture of Illuminating-gas.—Byron Sloper, New York City, and Robert M. Potter, Jersey City, N. J.

123,053.—Horse Hay-rake.—Solomon P. Smith, Waterford, N. Y.

123,054.—Tension Mechanism for Sewing-machines.—Samuel S. Spear, South Weymouth, Mass.

123,055.—Grain-door for Cars.—Henry Stahlnecker, Allentown, assignor to himself and John Smylie, Jun., Philadelphia, Pa.

123,056.—Door for Grain-cars.—Henry Stahlnecker, Allentown, assignor to himself and John Smylie, Jun., Philadelphia, Pa.

123,057.—Construction of Walls for Buildings.—William L. Stauffer, assignor to himself, Joseph H. Borneman, and Orlando Fegley, Allentown, Pa.

123,058.—Lathe.—Thomas Sullivan, Belleville, assignor to James L. Fralick, Picton, Canada.

123,059.—Railroad-car Ventilator.—Anthony B. Sweetland, assignor to himself and James Daley, Fitchburg, Mass. Ante-dated Jan. 20, 1872.

123,060.—Grape-box.—Sewall P. Talman, Perrysburg, Ohio.

123,061.—Sad-iron Heater.—William S. Teel, Washington, D. C.

123,062.—Bed-bottom.—Leopold Thomas and John A. Kurtz, Pittsburg, Pa.

123,063.—Horse Hay-fork.—Francis Van Doren, Adrian, Mich.

123,064.—Manufacture of Brushes.—William H. Van Kleek, Lansingburg, N. Y.

123,065.—Grain-wagon.—David Warnock, Champaign, Ill.

123,066.—Fire-escape.—William Medd Watson, Tonica, Ill.

123,067.—Steam-power Air-brake.—George Westinghouse, Jun., Pittsburg, Pa.

123,068.—Flood-fence.—Jerome B. Wolfe, assignor to himself, Nelson L. Wolfe, and Everett Messenger, Sen., Marion, Ohio.

123,069.—Locomotive-boiler Furnace.—John Wood, Jun., Conshohocken, Pa.

RE-ISSUES.

4,716.—Car-coupling.—Solon Owen Campbell, Center Town, Mo. Patent No. 97,376, dated Dec. 14, 1869.

4,717.—Washing Machine.—(Div. A.)—James M. Clark, Lancaster, assignor to Franklin L. Clark, Clarksville, Pa. Patent No. 117,603, dated Aug. 1, 1871.

4,718.—Machine for Washing and other Purposes.—(Div. B.)—James M. Clark, Lancaster, assignor to Franklin L. Clark, Clarksville, Pa. Patent No. 117,603, dated Aug. 1, 1871.

4,719.—Waterproof Floor.—Tobias New, New York City. Patent No. 113,787, dated April 18, 1871.

4,720.—Milk-house.—Henry Peregoy, Mount Carmel, Md. Patent No. 110,784, dated Jan. 3, 1871.

4,721.—Locomotive-wheel.—John R. Richardson, Max Meadows, Va. Patent No. 105,598, dated July 19, 1870.

4,722.—Feeding Mechanism for Cotton-openers, etc.—William Edward Whitehead, Miles Platting, England, assignor to himself and Abel T. Atherton, Lowell, Mass. Patent No. 110,318, dated Dec. 20, 1870.

DESIGNS.

5,479.—Shawl-pattern.—Henry Boot, assignor to Thomas Dolan, Philadelphia, Pa.

5,480.—Tassel-hook.—Hubert L. Judd, Brooklyn, N. Y.

5,481.—Carpet-pattern.—Alfred Heald, assignor to McCallum, Crease & Sloan, Philadelphia, Pa.

5,482.—Carpet-pattern.—Edmund Pyne, Morrisania, N. Y., assignor to Bigelow Carpet Company, Worcester, Mass.

5,483 to 5,490.—Carpet-pattern.—Charles T. Meyer, Lyon's Farms, Elizabeth, N. J., assignor to Edward C. Sampson, New York City.

5,491 and 5,492.—Floor Oil-cloth Pattern.—Charles T. Meyer, Lyon's Farms, Elizabeth, N. J., assignor to Edward C. Sampson, New York City.

5,493.—Type.—Carl Schraubstadter, Brookline, Mass.

5,494.—Toy Safe.—Anthony M. Smith, Brooklyn, N. Y.

5,495.—Shutter-fastener.—William E. Sparks, assignor to Sargent & Co., New Haven, Conn.

TRADE-MARKS.

635.—Saw.—Eben Moody Boynton, New York City.

637.—Labels and Show-cards.—Samuel Crump, New York City.

638.—Stop for Reed-organs.—J. Estey & Co., Brattleborough, Vt.

639.—Wood-carving.—Sorrento Wood-carving Company, Boston, Mass.

EXTENSIONS.

19,033.—Shingle Machine.—Robert Law. Jan. 5, 1858.

19,042.—Electro-magnetic Speed-governor.—George M. Phelps. Jan. 5, 1858.

19,081.—Mowing Machine.—Henry Fisher. Jan. 12, 1858.

19,105.—Carpenter's Rule.—L. C. Stevens. Jan. 12, 1858.

19,074.—Cushion for Billiard-tables.—Hugh W. Collender. Jan. 12, 1858; re-issued March 19, 1867.

19,147.—Ice-cream Freezer.—H. B. Masser. Jan. 19, 1858.

19,119.—Steam-engine.—Edward D. Barrett. Jan. 19, 1858; re-issued to said E. D. Barrett and H. B. Bigelow, Aug. 29, 1861.

APPLICATIONS FOR EXTENSIONS.

Opponents of extensions must file *written* objections in the Patent Office at least 20 days before the day-of-hearing; and on the Patent Office, and state the reasons of their opposition. All testimony—*pro* or *con*—must be taken and transmitted in accordance with the official rules, which will be furnished on application. The under-named patentees have recently petitioned for extensions (for seven years) of patents granted to them in the year 1858:—

John Denchfield, Syracuse, N. Y.—*Cooling and Drying Meal.*—Patented April 20, 1858; re-issued Jan. 16, 1872; testimony will close on March 19, next; last day for filing arguments and examiner's report, March 29; day-of-hearing, April 3.

Charles G. Frampton, Brooklyn, N. Y.—*Burnisher.*—Patented April 20, 1858; testimony will close on March 19, next; last day for filing arguments and examiner's report, March 29; day-of-hearing, April 3.

C. A. Waterbury, New York City.—*Apparatus for Damping Paper.*—Patented April 27, 1858; testimony will close on March 26, next; last day for filing arguments and examiner's report, April 5; day-of-hearing, April 10.

Henry R. Taylor, Boston, Mass.—*Drawers for Closets, Bureaus, etc.*—Patented April 27, 1858; testimony will close on March 26, next; last day for filing arguments and examiner's report, April 5; day-of-hearing, April 10.

Edward A. Tuttle, Brooklyn, N. Y.—*Warm-air Register and Ventilator.*—Patented April 27, 1858; testimony will close on March 26, next; last day for filing arguments and examiner's report, April 5; day-of-hearing, April 10.

Thomas Lee, Westport, Conn.—*Breech-loading Fire-arm.*—Patented April 27, 1858; testimony will close on March 26, next; last day for filing arguments and examiner's report, April 5; day-of-hearing, April 10.

S. B. Parkhurst, Montclair, N. J.—*Cotton-gin.*—Patented April 27, 1858; testimony will close on March 26, next; last day for filing arguments and examiner's report, April 5; day-of-hearing, April 10.

Dorcas E. Beadle, administratrix of James N. Wilson, deceased; and George W. Payne, Memphis, Tenn.—*Cotton-gin.*—Patented April 27, 1858; testimony will close on March 26, next; last day for filing arguments and examiner's report, April 5; day-of-hearing, April 10.

Hiram Smith, Newton Hills, Haddonfield, N. J.—*Device attached to Hand-saws for Squaring and Marking.*—Patented May 18, 1858; testimony will close on April 16, next; last day for filing arguments and examiner's report, April 26; day-of-hearing, May 1.

Henry Disston, and Julia A. Morss, administratrix of Thomas L. Morss, deceased, Philadelphia, Pa.—*Leveling Device attached to Hand-saws.*—Patented May 25, 1858; testimony will close on April 23, next; last day for filing arguments and examiner's report, May 3; day-of-hearing, May 8.

ENGLISH PATENT JOURNAL.

LIST OF APPLICATIONS FOR PATENTS

ON WHICH

Provisional Protections

HAVE BEEN OBTAINED IN ENGLAND BY OR FOR AMERICAN INVENTORS.

[*This list is condensed weekly from the "Journal of the British Commissioners of Patents," expressly for the* "American Artisan."]

2,486.—Apparatus for holding parcels while being tied, etc.—Marie Amelia Mauger, New York City.—Sept. 21, 1871.

2,488.—Composing and distributing type, and in type and other apparatus employed therein.—V. E. Mauger, New York City.—Sept. 21, 1871.

3,256.—Machinery for sawing stone.—Hugh Young, Stamford, Conn., and J. L. Young, New York City.—Dec. 1, 1871.

3,264.—Tie or fastening for securing bales of cotton and other merchandise.—J. T. Butler, New Orleans, La.—Dec. 2, 1871.

3,385.—Watch-protector.—W. B. Farwell, New York City.—Dec. 14, 1871.

3,417.—Coupling for carriage shafts or poles.—J. R. Potter, Dartmouth, Mass.—Dec. 16, 1871.

3,439.—Apparatus for supporting and adjusting the seats and parts connected therewith, in sulkies and other vehicles.—J. and L. Jenkins, Maryland.—Dec. 19, 1871.

3,465.—Apparatus for supplying fuel to furnaces.—S. Danks, Cincinnati, Ohio.—Dec. 21, 1871.

3,463.—Apparatus for reefing and furling ship's sails.—J. E. Worthman, Mobile, Ala.—Dec. 21, 1871.

3,464.—Manufacture of metal rods and wire, and in apparatus therefor.—B. A. Mason, New York City.—Dec. 21, 1871.

3,466.—Manufacturing copper-covered iron or steel wire.—S. Hiler, New York City.—Dec. 21, 1871.

3,473.—Machinery for drawing or rolling rods or bars into straight or conical forms for shafting, etc.—H. Kellogg, Milford, Conn.—Dec. 22, 1871.

3,483.—Infant's head-dress.—Louisa E. Love, New York City.—Dec. 23, 1871.

3,498.—Horse-nail machine.—E. W. Kelly, Boston, Mass.—Dec. 28, 1871.

3,503.—Apparatus for generating gas.—Henry Wurtz, New York City.—Dec. 28, 1871.

3,507.—Apparatus for carrying and discharging loads.—F. B. Colton, Philadelphia, Pa.—Dec. 28, 1871.

3,5 6.—Machinery for carding cotton, etc.—Charles J. Goodwin, Hampden, Mass.—Dec. 29, 1871.

Letter Box

G. L. G., of R. I.—For exceptional purposes your plan might prove economical; but where the power applied to the machinery is large, the direct connection of a small engine would be preferable. The same thing is, or was, in use in the City Gas-works, London. The "washers" required to be kept continually in motion, but involved a comparatively slight expenditure of power. A steam-pump raised water to a reservoir, from which it descended to a small turbine, which in its turn operated the washers. By this means the attendance of an engine-driver was dispensed with during the greater portion of the day.

M. R., of Ind.—We believe that each State Government is furnished by the General Government (from the Coast Survey Office) with a set of standard weights and measures, and with three standard balances of the most accurate construction. Of these, No. 1 will weigh articles varying from fifty down to ten pounds; No. 2, from ten pounds down to one; and No. 3, from one pound down to the one-thousandth of an ounce.

E. H., of Nevada.—The Palera process of treating silver ores comprised, 1st, pulverizing and roasting with common salt to convert the metals into chlorides; 2d, washing with hot water to dissolve out the chlorides of the base metals; 3d, treatment with hyposulphite of soda, by filtering the hyposulphite through it to dissolve out the chloride of silver; 4th, precipitation of the silver as a sulphide by the use of polysulphide of sodium; 5th, heating the sulphide of silver in muffles, with free access of air until the sulphur is expelled. The crude silver thus obtained was refined in the usual manner.

L. M. O., of Iowa.—The trouble with your photographic negative probably arose from the presence of water in the collodion. The water precipitates the pyroxyline held in solution; a streaky condition of the plate is caused as a consequence, and of course the heavy streaks absorb the most nitrate of silver.

J. T., of N. J.—You will find wooden chucks much less expensive for your work than brass, and upon the whole just as good. You will have to make them, however, as you need them. Your idea of "keeping a lot on hand to be handy" will not do, because even the best and driest woods will shrink or warp out of line in a little while. Get a few brass plates to screw on the mandrel, with four holes in each, to allow the fastening of a wooden chuck by means of wood screws. One of these plates will outlast twenty wooden chucks, for which it may be used in succession, and will be found a great convenience.

C. O. E., of N. Y.—Your invention is totally impracticable. It cannot move a boat forward. If only one side of the box were open, the propeller would have a slight tendency to move the stern of the vessel sidewise, but if both sides were open the vessel cannot be operated upon at all.

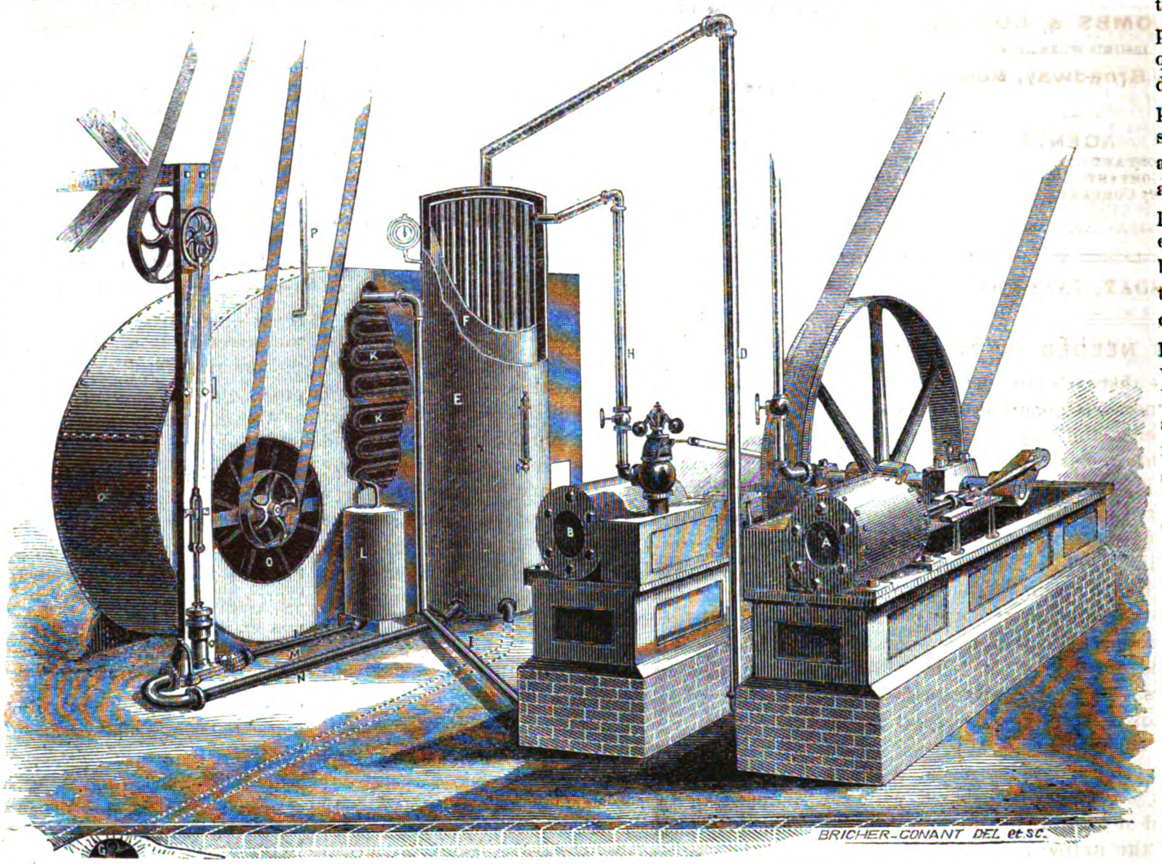
T. M. S., of Ind.—There can be no doubt that the strength of cast-iron is increased by reheating several times and keeping in a state of fusion for several hours before pouring. It is also well ascertained that wrought-iron increases in strength at each successive piling, heating, and rolling up to a certain number of times, after which it diminishes in nearly the same ratio as the processes are repeated. Whether the improved quality of the metal secured by such means is a full equivalent for the increased expense we do not know. Puddled steel bars treated in the same manner as wrought-iron have given the same results.

E. F. H., of Pa.—You are the second correspondent who has asked within a week for the shades proper to the tempering of various steel articles. We therefore give the list, including the temperature, at which each shade is produced:—For lancets, 220 degrees Fahr., pale yellow; razors, etc., 230 degrees, straw yellow; penknives, 243 degrees, golden yellow; cold chisels, 255 degrees, brown; axes and plane-irons, 265 degrees, brown dappled with purple; table-knives, etc., 277 degrees, purple; swords and coiled springs, 288 degrees, bright blue; fine saws and augers, 303 degrees, full blue; hand-saws, etc., 316 degrees, dark blue. To brown gun-barrels, rub them with tincture of iodine, lay them aside until coated with a film of rust, and then polish by friction and beeswax.

A. D., of N. Y.—Your idea of washing and drying potatoes before storing them for the winter is a good one, but you will find it difficult to make farmers adopt it during the hurry of the potato harvest. The same plan could be used to good advantage with roots for cattle-feeding were it not for the same drawback. A cheap and simple washing apparatus could be made, consisting of a rotary tumbling-box, with a current of water continually passing through it. In good weather, the surface drying of the roots or tubers could be secured by exposure to the sunshine, but a more reliable plan would be to so contrive the storage bins that warm air could be forced through the contents until the extraneous moisture was carried off.

Ellis's Patent Improved Motive Power.

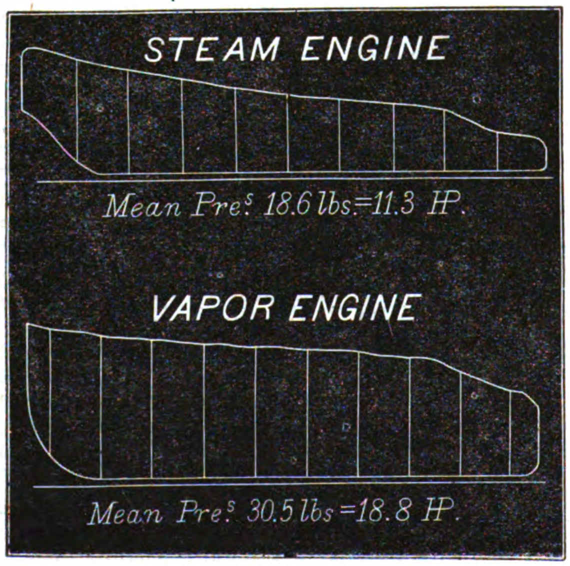
On page 43, current volume of the American Artisan, we published an account of the new vapor engine invented by Mr. J. A. H. Ellis, of Boston, Mass., and now being introduced to public use by the Vapor Engine Co., 100 Summer Street, in that city. The gist of the invention consists in using the heat of the exhaust steam from a steam-engine (or other source) to work a vapor engine. By this means it is claimed that an increase of power, per given quantity of fuel, of one hundred and sixty-six per cent., can be obtained over and above that from a steam-engine alone. In other words, the boiler fire required to produce one hundred horse-power by the generation of steam only will, it is asserted, produce upwards of two hundred and fifty when the steam motor is supplemented, as just indicated, by the vapor engine. We herewith present an engraving representing the apparatus used in demonstrating the working of the improvement. The following description, having reference to the engraving, will explain the arrangement of the parts and their *modus operandi* :—



ELLIS'S PATENT IMPROVED MOTIVE POWER.

"A represents an ordinary steam engine, worked by steam in the usual manner. D is the exhaust pipe of this engine, which conveys the exhaust steam into the top of the steam-drum, E; the exhaust steam passes down through this drum, and escapes at the bottom into the atmosphere, through the pipe, G (shown by dotted lines under the floor). The tubular boiler, F, is inclosed within the steam-drum, E; the exhaust passes around the outside of this boiler, and through its tubes, for the purpose of heating it. This boiler is filled with a volatile liquid, consisting principally of the bisulphide of carbon, which boils at 110°, and at 212°, the temperature of exhaust steam, gives a pressure of 65 lbs. to the inch. The vapor produced in the boiler, F, by the heat of the exhaust steam is used to drive the engine, B, in place of steam. The exhaust vapor from this engine is conveyed by the exhaust-pipe, I, to the condensing coil, K, K, and by passing through this coil is cooled and condensed to liquid again. It is discharged from the coil into the tank, L, from which it is drawn by the pump through the pipe, M, and forced into the boiler through the pipe, N, and used over again continuously, with very little loss.

"The coil, K, K, is kept cool by a current of air thrown over it by the rotary fan, O. A small jet of water is commingled with this current of air by means of a perforated pipe shown at P, which sprinkles a slight shower into the passing current. The evaporation of this moisture in the heated air carries away the heat from the coil, and keeps it cool, condensing the vapor perfectly. In cases where there is a sufficient supply of water convenient, the coil can be immersed in cold water,



and the rotary fan dispensed with. There are two engines, as we are informed, arranged on the foregoing plan, now running at the Atlantic Works in East Boston. They are ten-inch bore, and twenty-four inch stroke. One of them is run by steam in the usual way, and its exhaust taken to heat the boiler that drives the other. The diagrams herewith given, taken from these engines while doing their regular work, show that, while the steam-engine was producing 11·3 horse-power, the other engine, driven entirely by the heat of its exhaust, produced 18·8 horse-power—the two together producing 30·1 horse-power, with the same fuel previously required to produce 11·3 horse-power with the steam-engine alone—showing a gain of 166 per cent. of power from the fuel by the use of this process. Of course, the vapor engine may, when required, be at a considerable distance from the other, say in a neighboring building, to which the exhaust steam is conducted by a suitable pipe. Danger of explosion is avoided, as the heat of the exhaust steam will not carry the pressure in the vapor apparatus above seventy pounds to the square inch. In steamships, the saving of space for fuel is an evident advantage, and the condensation of the steam affords a constant supply of hot water, free from impurities, for the steam boiler. The waste of the liquid used in the vapor engine is very slight, not more than two and one-half cents per day per horse-power; furthermore, the improvement can be applied at moderate cost to steam-engines already in use. Such are the advantages claimed for the latest notable novelty in motive power, and, if substantiated by continued trial, they will prove of the utmost importance in the prosecution of nearly or quite every branch of industry. The invention has been secured by patents both in this country and abroad, and steps have been taken to obtain still further protection through the "American Artisan Patent Agency."

Kangaroo Leather.—Seven thousand kangaroo skins, from Australia, have been purchased by parties in this city, who are tanning them at a tannery, located on the northern part of Oakland, opposite Yerba Buena Island. This is the first consignment of kangaroo skins received in this market. The skin of this animal is thin, but exceedingly tough, and makes very pliable, tough, and durable leather, which turns water better than alligator leather. Boots of kangaroo leather will be a new sensation.—*Pacific Rural.*

AMERICAN ARTISAN

BROWN, COOMBS & CO., Publishers.

ISSUED WEEKLY AT

No 189 Broadway, New York.

H. T. BROWN. J. W. COOMBS.

AGENTS.

AMERICAN NEWS COMPANY..................New York City.
NEW YORK NEWS COMPANY.................. do
NEW ENGLAND NEWS COMPANY......................Boston.
A. WINCH & CO......................................Philadelphia.
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WEDNESDAY, JANUARY 31, 1872.

INVENTIONS NEEDED IN THE SOUTH.

THE changes that of late years have been wrought in the industrial condition of the Southern States have opened the way to improvement in many ways. This remark applies not only to the matter of working up the products of the soil into manufactured articles in the localities where produced, and to the introduction or revival of new sources of income, like the culture of indigo, madder, and the like, but also, in even a more manifest degree, in the adoption of novel machinery having no purpose and finding no use in other regions. A good example of this is found in cotton-seed planters. These implements, a few years ago, were unknown as far as their practical employment was concerned, but now, we are informed, they are made and sold at moderate prices, and give great economy as compared with the old hand method of planting. A kindred illustration is found in the linting of cotton-seed to save the twelve or fourteen per cent. of the weight in fiber of the rough seed; and to pursue the matter one sentence further, in the fabrication from cotton-seed not only of oil, but of cake, which, as an article of export, is by no means an insignificant item. Cotton-seed cake or meal is now admitted to be superior to the best linseed cake for cattle-feeding, and its value for this purpose is becoming more fully admitted every year.

But the measures of needed improvement in the agricultural and manufacturing methods of the South are as yet but slightly developed. And in this connection there seems to be an important and presumably profitable field for invention in the treatment of the sugar crop, which, aside from the preparation of the sugar from the juice, is not by any means as nearly perfect as it should be. A large percentage of the juice of the cane fails of extraction by the ordinary crushing or rolling mill, and it remains to be seen whether the diffusion process, or some modification of it, which has given such excellent results in the beet-root sugaries of Europe, cannot be applied in the manipulation of the cane.

But a more unoccupied, and possibly more important, demand for amelioration is to be found in the present clumsy and expensive mode of harvesting the cane. This is done by hand, though the need of machinery for the purpose is sorely felt not alone in our Southern States, but on the sugar plantations of the West Indies. In conversation not long since with a Cuban gentleman, he informed us that he was making special search for some apparatus for the purpose, and even for some projected plan for one. His efforts up to that time had been unavailing, and our own investigations, though comparatively superficial, have almost satisfied us that the subject has received little or no attention. As to the principle on which such a machine should be made, some hints may be gathered from other harvesting machinery, but these would in many cases be as likely to mislead as to guide. For instance, a corn-harvester would at once present itself as analogous to a cane-cutter. But an apparatus constructed on the plan of a corn-reaping machine would be likely to fail, because corn is planted in hills ranged in straight and uniform rows, but cane—as we are told—grows "all over." With these suggestions, we leave the question to the active-brained and restless men whose work it is to solve the ever-recurring mechanical and industrial problems of the times.

ANTI-PATENT AGITATION.

OUR staid and respectable contemporary, the *Journal of the Franklin Institute*, has passed into its sixty-third year, and at this mature age should have reached the period of discretion. It is rather a matter of surprise, therefore, that it should utter the language of extreme juvenility in calling editorial attention to what it terms "the very sensible remarks" of one of its correspondents concerning the American patent system—a system which has done more than all other causes put together to foster and develop American industries. This correspondent shall be nameless here, but we give a literal quotation of his language: —"We no longer need," says this sapient writer, "the incentive of personal right in invention or demonstration to develop our arts, and the writer, from his own observation, both in England and America, finds that the better class of engineers and mechanicians have come already to look with disfavor upon patents—a question of fact which will be confirmed by as many as have noticed the matter, and one that can be determined by searching the records of the Patent Office for the names of our best engineers."

It is mild language to say that these statements are "conspicuously inexact." The engineers who, in England, are most opposed to the patent laws are those who, like Sir William Armstrong, have made their way, not by the value of their own inventions, but by their dexterity in appropriating those of other people. American engineers are neither so foolish as to wish to throw away the protection of a patent system for themselves, or dishonorable enough to desire to break down the safeguards that guarantee protection to others for money, labor, and genius expended in bringing new improvements to practical form. As to their practice, it is precisely the reverse of that asserted by the writer above referred to. Rodman patented his plan of casting cannon; Dahlgren patented his guns. The working of heavy artillery by steam, as practised by Eads, is protected in the same manner; and so is the now highly approved mode of carrying water-pipes across the uneven beds of rivers. The method, disputed between John Dubois and George A. Parker, both distinguished engineers, of sinking the piers of the Great Bridge across the Susquehanna, at Havre de Grace, which required "four years' work of a thousand men," was the subject of patents. John A. Roebling, whose eminence none will dispute, obtained numerous patents on machinery relating to the manufacture of wire-rope and matters connected therewith. The same remark applies to the many notable inventors of iron bridges, which constitute some of the foremost of the triumphs of recent engineering; and, so far from finding American engineers averse to patents, it would be hard to select half a dozen of any recognized standing in the whole country who have refused an occasion to avail themselves of them.

A RAILWAY FERRY BETWEEN FRANCE AND ENGLAND.

AMERICANS who have crossed the Straits of Dover, and particularly those who have been landed on either shore after a rough passage of two or three hours in the pitiable condition that the miserable little Channel boats are well-calculated to reduce them to, will be pleased to learn that there is to be an improvement in the communication between France and England that may possess at least some of the convenience and luxurious comfort that belong to their own floating palaces. As to this, much depends, however, on the selection from different plans proposed, and the practical familiarity with such works of the projectors.

Within some years past several plans have been proposed. An engineer of Manchester submitted to the Minister of Agriculture and Commerce of France for adoption a plan of a boat, that might more properly be termed a raft, formed of a number of very long cylinders made of boiler-iron, placed side by side, with steamboat arrangements built upon them. This plan was intended to draw not exceeding three or four feet of water. Another by Mr. Daft, an engineer of some eminence in London, proposed a system of boat which consisted of two very long scows, with their straight sides and the usual rounded-up ends, framed together with a space between them for a paddle-wheel for propelling, after the fashion of the original American ferry-boats. This project was pushed with considerable energy for some time, but it is now probably abandoned.

The last number of the ARTISAN contains a description of a project by Messrs. Fowler and Scott Russell, of London, planned to carry railway trains in the manner of the old Susquehanna railway boat and several others now in use in the United States. This scheme, though lacking many essential accomplishments, according to American ideas, is doubtless the best production in that way that has emanated from European engineering skill.

Mr. Thomas Silver, of New York, who has spent the greater portion of the last seventeen years in England and France, was the first known to urge the adoption of a Channel ferry such as American engineers, from their greater familiarity with works of the kind, would consider adaptable to the wants of the Channel service, and for the adoption of which a treaty was commenced some years since with the French Government.

The boats, for a specific description of which we have not space in the present article, were carefully planned for the transport of trains without breaking bulk, and full provision was made for strength and safety, and for the avoidance, in the highest possible degree, of the pitching and rolling inherent to the use of the steamers now employed in crossing the straits.

The concessions asked from the Government were:—

First. The French Government to prepare, at its own expense, ample harbor accommodation at some point along the French coast contiguous to the narrowest part of the Straits of Dover.

Second. The French Government to abandon the ordinary system of port and light charges or dues, and substitute therefor against the ferry company an annual rental of not more than £—— nor less

than £——, which should cover all harbor charges against the ferry company.

Third. The company shall have the exclusive right to run steam ferry-boats constructed to carry railway trains, consisting wholly or in part, besides the locomotive and "tender," of passenger-carriages, merchandise, goods, baggage, coal, and other trucks intended for the transportation of any species of matter over railways, for the term of twenty years from the commencement of the practical performance of said ferry-boats.

Boulogne was preferred as the French port for arrival and departure, as the boats would connect at once with the Northern Railway to Paris or to Brussels by a new line of railway from Boulogne, joining the Calais road at St. Omer. With the extension of a breakwater out to sea from the southerly side of the entrance, one thousand feet, the harbor could be made safe and comfortable at all times of tide.

The difference between the French and English railway gauge, being 3½ inches, formed a difficulty in many trains through from London to Paris, which it was proposed to overcome by laying a third or inside rail on the French side, in which case, however, only the English trains could perform through service.

Mr. Silver's scheme met with great favor on the part of the Emperor, who promised that the French Government should perform all things required relative to improving the harbor arrangements for the company who should carry out the project. Baron Rothschild also expressed his satisfaction with the plan, stating that he had had experience in crossing on a similar boat in a railway train over the Susquehanna in the United States.

Within a radius of 500 miles of the crossing-point of the Straits of Dover, there is a population of 60,000,000 of people, possessing almost the heart of the world's wealth and industry, and a ferry consisting of boats of efficient magnitude for certain performance at all times of tide and weather would stimulate an untold amount of traffic, and we think it no idle boast to say that such a want on American premises would have been supplied twenty years ago.

Alaskan Arts.

In Alaska the houses much more resemble the semi-subterranean abodes of the Laplanders and Esquimaux than the wigwams of American Indians. Like the oak described by the American poet, they extend as far into the earth as above it. Some of them are from twenty to thirty feet square, and built of very wide cedar planks, many of them more than four feet across, worked out by these rude people.

We entered several. Creeping through apertures, both square and round, not more than three feet in diameter, we descended flights of steps into the large single room. In the center of each a fire was built on the ground, and in the center of each roof a hole, out of which passed a small portion of the smoke, the most of it remaining for the benefit of the salmon hanging over our heads, and to make sore eyes for the inmates. The whole inside is floored, except the fireplace in the middle. On both sides are the sleeping places, covered with skins and blankets, and in some instances separated by low partitions. In the rear, and on shelves below the dormitories, were stored potatoes and dried salmon in small bales, covered with matting. Their largest potatoes are the size of a hulled walnut.

The women were either cooking or working small baskets and other utensils of dried grass, in the manufacture of which they are surpassingly skillful. The men were building canoes outside, or carving odd images of wood or walrus ivory, for sale to curious voyagers. As time is of no value to these people, they bestow great labor for small rewards. A grass mat or basket, or an ivory carving that has occupied several days in its construction, can be bought for two or three bits, and a dressed deer-skin, tanned as only they can do it, over which some hours of many days have been spent, may be purchased for a trifle.

Their canoe-building is worthy of note. Out of a huge spruce or cedar tree they work a vessel of perfect symmetry that will carry from five to ten tuns. After roughly hewing it in the forest, they tow and drag it to their homes, which are always near the shore, to be finished at their leisure. An Indian does not like to be hurried. I saw many of these canoes in process of construction. The most curious operation is that of stretching them apart, when reduced to the proper thinness of an inch or more. Before stretching they may be four feet deep and only two feet wide at the top. After it these proportions will be reversed, making the width four feet. To accomplish this, the hollow is filled with water, which is raised to the boiling point with heated stones. It is then covered with mats until thoroughly steamed, when the stretching begins. The sides are kept apart by cross-pieces, which serve afterwards as seats for paddlers. But few of them have yet learned the labor-saving capacity of oars. They use no nails, but fasten their woods with roots and withes. They make spoons and other useful articles from the horns of the argali and the tusks of the walrus.—*Cor. Philadelphia Press.*

Metallic Sodium for Blasting.

Some years ago, Professor Wurtz, of New York, instituted experiments on the explosive force of sodium, and obtained some startling results, but the idea of using the metal for blasting purposes did not awaken enough interest to lead to its practical adoption. We now hear that the subject is again revived, without giving Professor Wurtz the credit that is justly due to him. The calculation upon which the application of sodium is based is as follows:—To decompose 9 parts by weight of water, 23 parts by weight of sodium are required, and the product is 31 parts of soda and one part by weight of hydrogen. If we employ 46 grammes of sodium, this will evolve, with 18 grammes of water, two grammes of hydrogen, which occupies a space of 22,471·9 cubic centimeters. If the glass ball containing the sodium has the capacity of 50 cubic centimeters, it will hold about 46 grammes of sodium; the hydrogen gas from this quantity of sodium will exert an explosive force against the walls of the vessel of 450 atmospheres. The application of the sodium for the purpose of blasting is made as follows: Two glass bulbs of 50 cubic centimenters capacity are blown with a neck of glass between them; one bulb is filled with sodium and the other with water, and between the two is fused a soluble salt. The length of time required to dissolve the salt can be ascertained by experiment, and the connecting tube be made so as not to have the charge fired prematurely. The bulbs, with the sodium below, are let down into the drill-hole, the water gradually dissolves up the salt and thus comes into contact with the metal, and the explosion follows. How far the full force of the sodium can be brought into play is uncertain, as it is necessary that the whole of it should be consumed in decomposing the water, and the explosion may follow before the water has penetrated far enough into the interior for this purpose. Considerable sodium would be apt to be scattered about to set fire to surrounding objects. There is no doubt about the force of the explosion, as we know by experiments that we have tried in a small way, but whether the thing is feasible on a large scale is a question which we do not feel competent to answer.—*Jour. of Applied Chemistry.*

Explosive Bullets.

It is satisfactory to hear that in the late war between France and Germany neither belligerent used explosive bullets. Each vehemently charged the other with using these horrible missiles, and each as hotly denied the charge. It seems that a series of experiments has been carried on at Basle with a view to determine the fact, and that the result has been that of common exoneration. One of the experiments named is certainly singular. The fragments of a supposed explosive bullet have been collected from a wound, put together, and found to correspond accurately with the standard weight of the missile thus, of course, showing that it must have been of the ordinary kind, and not hollow, as it must have been to hold any explosive substance within. The mistake so freely made is accounted for in various ways. One is, that a bullet suddenly encountering a button, or any other hard substance, has its momentum destroyed and changed into heat. Sometimes, in fact, the temperature produced is so high as partly to melt the bullet; and it usually happens that, if the temperature acquired by the ball from the burning of the powder and the friction of the barrel is added to the caloric produced by striking a hard surface, the melting-point of lead is exceeded. This, according to the report of the experts at Basle, fully accounts for most of the supposed explosive bullets, and frees the armies of both nations from the aspersion cast upon them.—*Exchange.*

Needed—Better Safes.

The London *Engineer*, in commenting on the asserted truth that fully one-half of the Chicago safes failed to preserve their contents during the recent fire, and that the losses are not confined to small safes, but include the larger first-class safes of the best makers, says that enormous prices have heretofore been exacted for safes, and those charging most for their goods have been the loudest in trying to convince the public that their articles were the best. But the Chicago fire has demonstrated that it is not the price charged for a safe, nor the prettiness of its paint, that imparts preservative qualities. It is evident that the present methods of safe-making are sadly deficient, and that improvements are greatly needed. There is abundant room for inventive geniuses to devise something new and really reliable in the way of fire-proof safes.

A Simple Fire Department.

The Fire Department at Florence, Italy, according to the sculptor, Hiram Powers, consists of ten men, three equipped with pipes, four with buckets, and three with small brass fire-extinguishers. Very little occasion is found for the services of these ten firemen, as all the floors and ceilings of the houses in Florence are protected with brick tiles. In Mr. Powers's house there are no joists, and a room twenty feet square has an arched ceil-

ing of tiles, which was laid by four men in four days. These floors covered with tiles, it is stated, are no colder than wood, and can be as easily carpeted. Mr. Powers recommends the introduction of Italian brick-masons into the United States, to instruct our builders in this description of work.

Dangers to Coast Fishermen.

ONE has to consider the statistics to comprehend how precarious and dangerous our coast fishery is. The Gloucester *Advertiser* informs us that 20 vessels belonging to that port, with 140 lives, have been lost during the present season, against 13 vessels and 95 lives last year. The value of the craft lost in 1871 is stated at $92,000, with about $78,000 insurance. In the George's fishery, 10 vessels and 95 lives have been lost; 17 vessels and 28 lives in the Bank fishery; 1 vessel and 4 lives in the mackerel fishery; 1 vessel and 12 lives in the Greenland halibut fishery; 2 vessels and 1 life in the shore winter fishery; 1 vessel in the herring fishery; and 1 in the coasting trade.

British Naval Blunders.

IT seems that ours is not the only Government that occasionally does ridiculous things in matters of mechanical engineering. According to the leading English journal, complaints are rife in the smaller British ships-of-war, armed with 64-pounder rifled guns of 3¼ tuns weight, as to the difficulty of working these weapons rapidly and efficiently in steaming round targets at high speeds, and with great helm movement. It says that "these converted guns are mounted on common wooden four-truck carriages, if not of the same pattern as was used in the ark, at least of the identical one employed a couple of centuries before 'the reign of Queen Anne.' They require fourteen men to manage them, or the same number that is commonly employed with the 12-tun gun on Scott's mechanical slide carriages. And the men find it impossible to change the direction of the gun with sufficient rapidity to follow the movements of the helm and of the ship. Thus the opportunity of firing whilst the target is in bearing being let slip, the gun becomes practically useless unless the tactical movements of the ship be stopped for a time."

California Wire-rope Manufacture.

THERE are few more energetic men among the pioneers of California manufactures than A. S. Hallidie, the President of the Mechanics' Institute in San Francisco. We learn from the *Scientific Press* that an iron wire-rope weighing 9,500 lbs. has just been completed at the Hallidie Wire-rope Works, in that city. It is five inches wide, one-half inch thick, and 2,000 feet (nearly half a mile) long. One hundred and fifty miles of 15½ gauge wire was used in its construction. It is the first rope manufactured entirely of California-made wire, and the largest ever turned out in America. It will be immediately shipped to Virginia City, Nevada, for use in the Empire-imperial shaft of the Imperial Mining Company. This California Wire-rope Company are the only manufacturers of flat-iron rope in the United States. They have now on the way from Europe improved machinery for making what is termed flexible wire-rope. It will run 13 bobbins, and lay up a rope of 144 wires, with 19 wires in the strand.

Tests of Iron for Building.

DURING the five months in which the law requiring iron beams, girders, etc., to be tested has been in operation, there have been tested in New York City 72 box lintels, 67 Hodgkinson beams, 224 Fairbairn beams, 191 arch girders, and 22 wrought-iron girders. Of this number, 1 box lintel, 4 Fairbairn beams, and 9 arch girders were rejected by reason of their great deflection or their permanent set, while 1 Fairbairn beam and 3 arch girders gave way under the test. One of these girders, which was to sustain 59 tuns, gave way on a pressure of 12 tuns, while another broke at a pressure of 2 tuns, when it should have sustained a pressure of 72 tuns. The defects in these lintels, beams, etc., were such that they could be discovered only by the test.

Corn in the Ear for Fuel.

AN Illinois paper says that in Hardin County, in that State, hitherto "farmers came twenty and thirty miles for coal, and often waited at the coal-banks three days and nights for their turn to get coal, during which time their families were saved only by burning corn, and the conscientious scruples of almost any man against such a use of the great staple of food would have mellowed down. Corn is only eighteen cents per bushel. Fifteen or twenty miles from the railroad, as it is worth six cents per bushel to haul it to market, reduces the price to twelve cents. At this price it is cheaper fuel than coal at five dollars per tun. At this time—and it will continue all winter, unless coal becomes plentier and cheaper—thousands, if not millions, of bushels of corn will be used in Northern Iowa for fuel.

Paper from Wood.

THE abolition of the paper duty in England has led to many experiments with a view of increasing the supply necessary to meet the greatly extended consumption, especially in the direction of utilizing new materials and adapting them to the manufacture of paper. But among all these we may safely state that none are more ingenious or successful than the remarkable machinery invented and patented by Mr. James A. Lee, of the Severn Engineering Works, Sydney, Gloucestershire, for cutting wood for paper-making, and apparatus requisite for the other processes of its manufacture.

The first requisite to the profitable use of timber in paper-making is a machine for cutting up the wood, and breaking it into small rugged particles of uniform size. Before Mr. Lee undertook the matter, it is said that the Gloucestershire Company, after expending nearly £50,000 in the effort to make paper from wood, were at the point of abandoning the enterprise altogether. Mr. Lee, however, has produced a machine by which a boiler can be charged with 30 cwt. of wood, and it produces about eight tuns of perfect breakings per hour, by the action of a powerful horizontal engine.

The wood-cutter consists of a massive cast-iron disk, to which a knife is secured, which, revolving at a great speed (200 to 300 revolutions per minute), slices off sections, half an inch thick, from the ends of stout timber balks into an inclined hopper. Suitable rolls feed the wood up to the face of the disk, and a pair of horizontal rolls receive the slices as they drop from the knife, and disintegrate the curved cross-sectioned slices. This is so thoroughly done, that a log of timber 14 inches square, under the action of knife and rolls, drops out in bits ½ inch square by ⅛ inch thick, with jagged surfaces which make every particle amenable to the strong chemical agents to which it is afterwards subjected. To prevent accidents, many of the driving-axles are made conical. The journals of the feeding rolls are also furnished with springs, to allow, without adjustment, difference in the size of the wood brought to the knife. The disintegrating effect of the rolls is caused by the one being made to revolve at a different speed from the other. The complete machine weighs 16 tuns. The boiler is horizontal, 32 feet by 3 feet 9 inches, heated by high-pressure pipes, in which water circulates from the furnace through the boiler and back. The chips are thrust into cages at one end of the boiler, and they are subject on all sides to the action of boiling liquid, while they are not liable to float; these cages are of circular shape, and made of iron wire. About ten of these cages, laid end to end, fill the length of the boiler. For the purpose of converting the chips into paper-producing material, a solution of caustic soda is pumped into the boiler, and the cages remain for six hours at a temperature of 220° Fahr. The pulp, which can then easily be pulverized between the fingers, is ready for manipulation in the paper-mill, in the usual way.—*Mechanics' Magazine.*

A Small Screw Loose Somewhere.

IN "Proposals for Stationery," advertised by Postmaster-General Creswell, we find these specifications of articles for which bids are solicited:—

"25 dozen pen-knives, Rodgers & Son's, four-bladed, buckhorn handles, genuine, per dozen.

"6 dozen pen-knives, Rodgers & Son's, small size, four-bladed, pearl handles, genuine, per dozen.

"15 dozen erasers, Rodgers & Son's, polished bone handles, genuine, per dozen."

It seems a farce to solicit bids for articles while allowing but one house to supply them. Rodgers & Son make good pen-knives, but so do several American makers whom this advertisement excludes from competing. We insist that Americans who make as good knives as Rodgers & Son should be allowed to supply the number wanted, provided they will do so as cheaply as will their foreign rivals. Is not this fair?—*N. Y. Tribune.*

Border Billiarding.

A KANSAS billiard table is thus described:—"First, in the middle of the floor was an enormously large box, on which was laid about a wagon load of sandstone, covered with about eight yards of blue jean. The pockets were made of old boot-legs; for cues they had old hoe-handles; mock-oranges served for balls; and to count this lovely game they used dried apples strung on a clothes-line."

A CHINESE WIND-BARROW.—One of the strangest sights in China is their wind wheel-barrow; it is drawn by a donkey, and when the wind is fair a sail is set. The wheel turns in the middle of a wooden frame, sustained by iron bars. Upon the frame are hung all kinds of utensils. The donkey is generally mounted by the paterfamilias, the son and heir is at the stern assisting all he can, while the mother and younger ones ride on the vehicle.

TOBACCO-GROWING ON LONG ISLAND.—The Sag Harbor *Express* strongly urges the farmers of Long Island to cultivate tobacco instead of their usual crops, and thinks that in doing so they could make dollars where they now make cents. It says that the Connecticut farmers are rapidly growing rich by raising crops of tobacco.

NEW AMERICAN PATENTS.

We give, as follows, notices of some of the most interesting inventions for which Letters-Patents of the United States have recently been issued:—

Pressure-gauge.—J. Brown, Jun., New York City.—*Jan.* 16.—In this device, a flexible segmental bulb is arranged in suitable relation with a column, an annulus or disk, and a piston. The cylinder contains mercury above the piston, and is connected with the steam-pipe and with the blow-off cock, the same being applied in combination with the bulb, the disk, and the column. In a pressure-gauge having an adjustable scale is also claimed the construction of the hole of the adjusting screw, with a counter-sunk head for the reception of the seal, with a cap for its protection.

Iron Building.—J. M. Cornell, New York City. —*Jan.* 16.—This inventor claims, in the art of constructing buildings, the essential members of a facing cast together, and to and with the framework, in such a manner as to form part of it.

Drop-light Gasalier.—J. Horton, New York City.—*Jan.* 16.—This is a drop-light gasalier in which the gas is conducted to the stationary branches through or by means of a space between the outer and the inner tube.

Agricultural Boiler.—P. H. Inman and C. B. Withington, Janesville, Wis.—*Jan.* 16.—This steam-cooking apparatus consists of a reservoir, cooking vessel, stove, coil provided with cocks, pipe, and branches, the latter having a three-way cock at their junction, all constructed and arranged for conjoint operation.

Puddling Furnace.— D. Morgan, Pittsburg, Pa. —*Jan.* 16.—This invention comprises a puddling furnace in which water-boxes are separately constructed and arranged around the hearth, in combination with their respective inlet and outlet tubes and a suitably arranged water-tank.

Water-wheel.—J. Mullica and B. Mullica, Waterford Works, N. J.—*Jan.* 16.—This invention embraces a turbine water-wheel of the class having an upper case and a lower case. It is provided with an inner series of buckets having vertical sides and inclined roofs, in combination with a series of surrounding scroll buckets arranged below them. There is also included in the invention the feature, in a turbine water-wheel, having an upper case with scroll buckets, and a lower case with inclined scroll buckets, of a series of buckets having inclined roofs, and constructed with a screw-shaped gain or depression, to give the descending water a whirl, as is found advantageous in the operation of the wheel.

Lamp for Railway-cars.—W. H. Paige, Springfield, Mass.—*Jan.* 16.—The more noticeable feature of this invention comprises levers hung upon a pivot or fulcrum, weighted at the outer end and connected at the inner to the lower extremity of a tube by means of a fork and a suitably arranged flange, whereby the tube is drawn down when the weighted end of the lever is drawn up.

Rack for Water-wheel Flumes.—G. W. Russell, Lawrence, Mass.—*Jan.* 16.—In this apparatus is combined, with the flume or inclosing case of a turbine water-wheel, a gate for closing water communication between the same and the railway or discharge sluice, when said gate is located below, and so as to cover the bottom central opening of the flume or case, and arranged to move toward or away from said opening.

Paint from Magnesite.—J. Briggs, Boston, Mass.—*Jan.* 16.—This paint is composed of the mineral magnesite, or carbonate of magnesia, ground in linseed oil or other suitable vehicle. The claim also covers a paint made of the mineral magnesite, or carbonate of magnesia, ground with other pigments or bases in any suitable vehicle.

Decorative Oil Painting.—J. M. Lasché, Paris, France.—*Jan.* 16.—This, a new article of manufacture, consists of a portable oil painting or tin-foil, that is to say, tin-foil painted in oil, either plain or ornamented, to be transported and applied to any suitable use. There is also claimed the process of ornamenting surfaces in buildings, ships, etc., on wood-work, plaster-work, metal-work, and the like, by applying on said surfaces a tin-foil on which ornamentation has been previously executed in oil painting or gilding, or both.

Fireproof Column.—W. A. Berkey, Grand Rapids, Mich.—*Jan.* 16.—The more noticeable characteristic of this improved column (which is constituted by an inner and an outer cylinder, the inner cylinder provided at one end with a flange or cap) is the shortening of the outer column so as to leave a free space between its top and the base of the cap for a free longitudinal movement of the outer column by expansion or contraction.

Machine for straightening Finger-bars.—J. Corns, Akron, Ohio.—*Jan.* 16.—This is a machine for straightening harvester finger-bars, and it consists of vibratory arms having thereto attached dies or swages arranged to operate in conjunction with certain other dies or swages, suitably provided.

Stamping Press.—J. W. Dodge, Boston, Mass. —*Jan.* 16.—This relates to a self-inking machine for printing, embossing, inking, etc., provided with an ink roller and die, so operated by and in connection with suitable devices, as to partially revolve the ink-roller and die forward and backward horizontally in a contrary direction with each other. The die is so arranged and operated in connection with a gas-jet or other heating apparatus, and suitable operating devices, as to act independently of the ink-roller.

Manufacturing Flat Ornamental Chains. —J. J. Freeman, Attleboro, Mass.—*Jan.* 16.—This inventor claims, as an improvement in the art of making wire chains, consisting of a series of rows of beads held together by transverse staples, the bending of one limb of the staple down upon and around the outer link, and shortening the other limb and bending it down upon the link in the next adjoining longitudinal row of beads, thus producing a chain without soldering, in which the transverse staples present the same appearance on both edges.

Peanut Sheller.—J. W. Sands and B. F. Walters, Norfolk, Va.—*Jan.* 16.—This peanut-shelling machine comprises in its construction a hopper, rotating toothed cylinder, adjustable stationary toothed concaves, fan, shaking sieve and inclines, the whole arranged and combined for the purpose just indicated.

Sash-holder.—G. M. McConnell, Jacksonville, Ill.—*Jan.* 23.—This invention consists in the combination of a double cam faced with rubber, a square box, which receives the operating shaft of said cam, and forms a means of attaching the cam and shaft together, and a spring interposed between one side of the said box and adjacent side of the cam, the whole arranged in a suitable shell or case to be attached to a window casing, and constituting a stop, which, neat in appearance and noiseless, is very effective in its operation, and will not injure the sash to which it is applied.

American Inventions Abroad.

Sewing-machine Attachment.—J. K. Pruyn, New York City.—1. The first attachment for producing a buttonhole stitch is secured upon the bed, the looping devices being operated by the shuttle-carrier by improved means. 2. The mechanism is connected to the frame over the bed, and operated by the needle-bar or other moving part above; it consists of two operating parts, a looper and a vibrating finger moved intermittently.

Printing Lozenges.—E. Greenfield and P. Strauss, New York City.—This consists of a machine containing a combination of devices by means of which lozenge dough or paste is printed upon and carried forward without stoppage on an endless apron (passing over rollers), beneath a perforated cutter, which stamps the lozenges from the dough or paste. The printed lozenges, rising through the perforations in the cutter, fall over an inclined plane trough into a vessel prepared for their reception, while the wastage from the cutter continues its transit with the endless apron until it falls into a reservoir, whence it is taken to be rekneaded with the rest of the paste or dough.

Automatic condensing Steam-pump and Motor for elevating Water and Propelling Ships.—D. A. Burr, Washington, D. C.—This relates to an apparatus for elevating water or propelling vessels, wherein the water is drawn into a cylinder by means of condensation of steam, and expelled by direct pressure of steam. The arm or lever opening and closing a cock or throttle valve in the steam supply-pipe is connected by an intermediate rod with an elastic diaphragm over the mouth of a pipe opening into the cylinder. A direct communication between the cylinder and an elevated reservoir of water is made by a steam-pipe opening into the lower portion of the cylinder, and an injection-pipe leads from the said reservoir and opens into the cylinder. A second elevated reservoir has a second injection-pipe opening into the upper part of the cylinder. In the cylinder is a hot-water piston formed of two or more disks or flanges upon a central tube encircling a guide rod. In the propulsion of vessels the water is drawn into the cylinder from the bow by the production of vacuum in the cylinder through the condensation of steam, and expelled with the pressure of the steam thereon at the stern.

Screens for Coal-gas Purifiers.—E. Duffee, Haverhill, Mass.—This consists in forming the screens of thin strips of wood crossing each other, notched together or interlaced, and supported by a framework. Also, in making a groove in each outer vertical face of the frame, so that the looped ends of the interlacing strips shall be imbedded or sunk below such face, or forming the side bars of the frame with projecting tenons or abutments, and the end bars with extensions or their equivalents, of such length as to protect the said looped ends from injury and wear.

Apparatus for bathing and washing the Head and drying the Hair.—M. L. Winn, New York City.—A bottomless basin on an adjustable standard is combined with an elastic cushion and flexible turban, water-tight round the head. Gloves with finger brushes are used; and a movable elastic yoke and sprinkler, with a tray set round the neck with an elastic conical collar. For drying long hair, a case is warmed on which it is spread.

Tanning and Tailoring in Patagonia.

The most important part of the occupation of the women of the Tehuelches, a Patagonian tribe, is the making up of skin mantles. The skins for these mantles are first dried in the sun, then scraped with flint, agate, or obsidian. They are then smeared over with grease and liver kneaded into pulp, after which they are softened in the hand until quite pliable, when they are placed on the ground, and cut with a small very sharp knife into pieces dovetailed into one another, so as to secure strength of seam. These pieces are parceled out among women, who are also given a corresponding quantity of needle and thread, consisting of bodkins formed out of sharpened nails, and dried sinews from the back of the adult guanaco. These mantles are painted with great care, the ground being red and black, blue and yellow being used for the ornamental spots and lines. The women work and sew with great energy and rapidity. When a man is married, his wife or wives, assisted by their friends, manufacture his mantles, but bachelors are reduced to the necessity of giving out their skins to some fair lady, who pretends to work on half profits, always taking good care that her half share is the largest.

The domestic exports of the port of Philadelphia for 1871 were of the value of $20,685,551, against $16,640,478 in the year 1870.

Recent English Patents.

Fog-signal.—E. Keirby.—This relates to a ball, with an internal spherical core, on which a series of pegs to receive a series of percussion caps are fitted, the remaining space between the shell and core being filled up with gunpowder, the whole being exploded by the passing of a wheel over the top of the ball.

Lamp.—P. Adie.—This invention consists in supplying oil to the wicks of lamps drop by drop, from an elevated reservoir, a fine capillary tube inside the wick-supply tube serving to insure the proper amount of supply.

Ornament for Windows.—J. Brock.—According to this invention, the base of the ornament is to be made of cast or wrought iron or steel, and is to be washed and coated with an enamel mixture to which a small quantity of gum has been added. The coated article is next dried and heated in a muffle, so as to fuse the enamel upon its surface. A second coating of white or colored enamel is next applied in the same way. The enameled surface is next ornamented, by a stencil-plate and brush, with gold or an amalgam of gold.

Carriage.—W. Archer.—The door is at back, and the front is made semicircular. The driver's seat is also at back, and is attached to the door; it turns aside with the door when the door is opened, to give free ingress and egress. A conical roller near the top of the door carries an awning, which is unrolled by the action of the door, thus a covering is made for any one entering or leaving the carriage.

Saddle.—T. Huckvale.—The stirrup-bar is movable upwards on a screw-pin or axis, so that the falling off of a rider causes the stirrup leather to slide off. The pads are made with a step at the bottom, so that the step leather may be moved higher or lower for accommodating the length of the rider's leg.

Attaching Pikes to Handles.—J. Jackman.—The inventor provides a socket of malleable iron for receiving the picking tool or blade, this socket being attached to a wooden handle, the blade being made with a depression or protuberance which fits into a corresponding part of the socket. The tool or blade is secured in the socket by means of a set-screw, the point of which acts upon a gib.

Medicating Cotton Fibers.—J. Gamgee and W. H. Maitland.—Cotton and other fibers are saturated with chloralum or chloride of aluminum, carbolic acid sulpho-carbolates, permanganate of potash, or charcoal, or with solutions of opium, morphia, hydrate of chloral, of other narcotics and sedatives, in order to obtain wadding felt, cloths, or wool charged with these medicinal agents, for surgical or sanitary purposes.

Refrigerator.—J. Gamgee.—Through a series of long tubes fixed at their ends in tube-plates, the inventor runs a corresponding series of tubes of a smaller diameter and slightly longer, with their ends also fixed in tube-plates, and the spaces between these tube-plates are made to form closed chambers. The interior of these chambers at the different ends of the pipes are connected with one another by the thin annular spaces which intervene between the inner and outer tubes. The refrigerating medium is caused to flow from one chamber to the other through these annular spaces, while the liquid to be cooled passes over the outer surface of the large tubes, and also through the small tubes. The inventor proposes to use a condensing pump in order to quicken the evaporation of the liquid used in the production of cold. The invention also consists in the use of formiate of methyl, acetate of methyl, or a mixture of ether, protoxyd of nitrogen, and as substitutes for the air, ether, or ammonia usually employed in these machines.

Scouring and Rinsing Wool.—W. Brookes.—This consists in the use of stirring rakes and extracting rakes in scouring and rinsing machines. The wool is placed in a bath of hot alkaline liquor, and acted on by stirring, and a combined stirring and extracting rake fixed to jointed levers and crank-arms, so as to oscillate. The wool is delivered on an endless apron, and conducted between pressing-rollers to a delivery-roller. In rinsing in a tank of running water, the wool is subjected to the action of two oscillating stirring rakes, and an extracting sliding rake, which discharges it outside the machine to a suitable receiver.

British Torpedoes.

One workshop in the Royal Laboratory Department, in the Royal Arsenal, Woolwich, England, is devoted almost exclusively at the present time to the manufacture of marine torpedoes, the staple material of which is wood, sound oak or elm, or other suitable timber, being selected for the purpose. The torpedoes are pear-shaped, about two feet through the largest diameter, and they are bound with iron bands, which will give them a specific gravity a little greater than that of water, and so keep them, when in use, a little below the surface. They are intended to be charged with gun-cotton, for the reception of which a chamber small in comparison with the external dimensions of the torpedo is bored out, and they are designed to be fired by electricity, either from the shore or from friendly vessels.

In Dingler's *Polytechnisches Journal*, a description is given of a very simple apparatus for determining the richness of milk, as measured by its transparency. Two polished plates of glass are adjusted by means of a screw, to stand at different distances from each other. The milk is placed between them; and the distance of the plates from each other, when the flame of a stearine candle is rendered invisible, is the measure alike of the transparency and richness of the milk.

Photo-lithography.—Caoutchouc is stated by the Berlin *Phot. Mittheilungen* to be sensitive to light in a peculiar manner. A film of caoutchouc, attached to a lithographic stone and exposed to the light, gives to the stone the property of taking up greasy inks upon the portions so exposed. Upon this fact a lithographic process is founded, by taking a sheet, coating it with a layer of caoutchouc dissolved in benzole, exposing this beneath a photographic negative, and transferring to the stone.

The cultivation of beet-root sugar in France has now risen to an industry of the first importance. It employs more than 400 manufactories, and the process of manufacture is each year brought to a higher state of perfection. There are in France three or four journals specially devoted to subjects connected with the manufacture, its cultivation, its sale, the machinery required, the chemistry of the process, etc.

A railway tunnel between Scotland and Ireland has been proposed, to go from near Cushendall to the Mull of Cantyre; and a detailed description, with an estimate of the cost, has been published. The length would be about fifteen miles.

Artificial Basis for Furs, Etc.

A recent English invention refers to means by which the hair or other covering of animals may be held in position as on the natural skin, while that skin is removed, and until a substitute is applied to the roots of such hair or covering to retain them. The present improvements are means for acting first on the hair on the natural skins, and also to the use of glue, size, gelatine, or the like glutinous animal matter applied to a solution, so as to form, when cool, a body to hold the hair in position during the removal of the natural skin and the application of a substitute to the roots. The hair and natural skin are loosened by soaking in lime-water or other suitable means. The artificial skin may be formed of india-rubber, gutta-percha, or compounds thereof, boiled or drying oil or other adhesive matters, strengthened if desired by woven fabrics, and, when applied and set, the glutinous matter employed as temporary holding media may be removed by dissolving in warm water or steam. In some cases carbonate, sulphate, sulphite, phosphate, acetate, or hyposulphite of soda, in a state of fusion, is employed as a substitute for the animal glue.

More Water for San Francisco.

San Francisco has abandoned the notable scheme of getting its water from Lake Tahoe, on the top of the Sierra Nevada Mountains. A commission of its city government, backed by scientific engineers, report decidedly against it, and say that there is enough of good water for a city of a million inhabitants to be had on the peninsula of San Francisco itself, and that, in short, it is only necessary to enlarge its present sources and take in neighboring creeks and springs, to get a supply of sixty million gallons of water a day, which would be forty gallons apiece for a million and a half people. But the Lake Tahoe scheme was so audacious it will be hard for the true Californian to give it up.

There are at present 100 miles of block ice on the Hudson, ten inches thick, and ice-men state that such a surface has not been known for years. By the close of this week 5,000 men, boys, and horses will be at work at all points, and, aided by steam elevators, will hurry the harvest to a close. All doubts, therefore, as to any scarcity of ice may be at once dispelled, and consumers can look forward to the heated term with an assurance that the number of cooling blocks will be equal to the demand.

Recently, at the Royal Cornwall Geological Society, Mr. Hallet Batten read a paper from Mr. Pearse, of Swansea, accompanying a specimen of pitch blende, or oxyd of uranium, picked up by himself in Colorado, the first specimen ever collected in America. A miner there had told him it had caused them a great deal of trouble by interfering with the copper lode, and was very much surprised to learn that it was worth in England two thousand dollars a tun.

The whole number of wood-screws consumed in the United States is 27,000,000 gross per annum. We do not export screws from the United States, except a few to Canada and South America. By far the largest number consumed in this country are made within its limits. There is probably an average importation of 2,000 gross per day.

Civilization is doing something for Japan. Among other fresh items of intelligence from that favored land is the information that a great many fires have occurred at Yeddo, "all caused by the careless use of kerosene."

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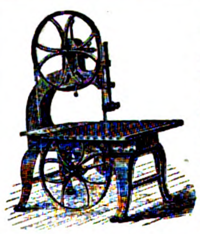

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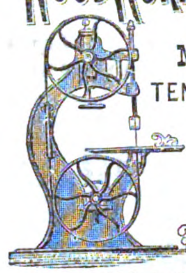

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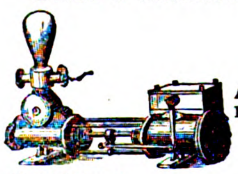
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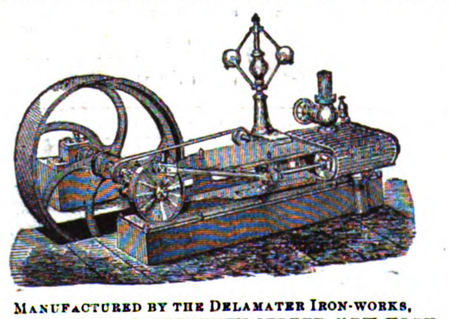

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VOLUME XIV. New Series. } NUMBER 6. NEW YORK, FEBRUARY 7, 1872. { $2 00 PER ANNUM IN ADVANCE. SINGLE COPIES, FIVE CENTS.

CONTENTS OF THIS NUMBER

[Illustrations are indicated by an asterisk.]

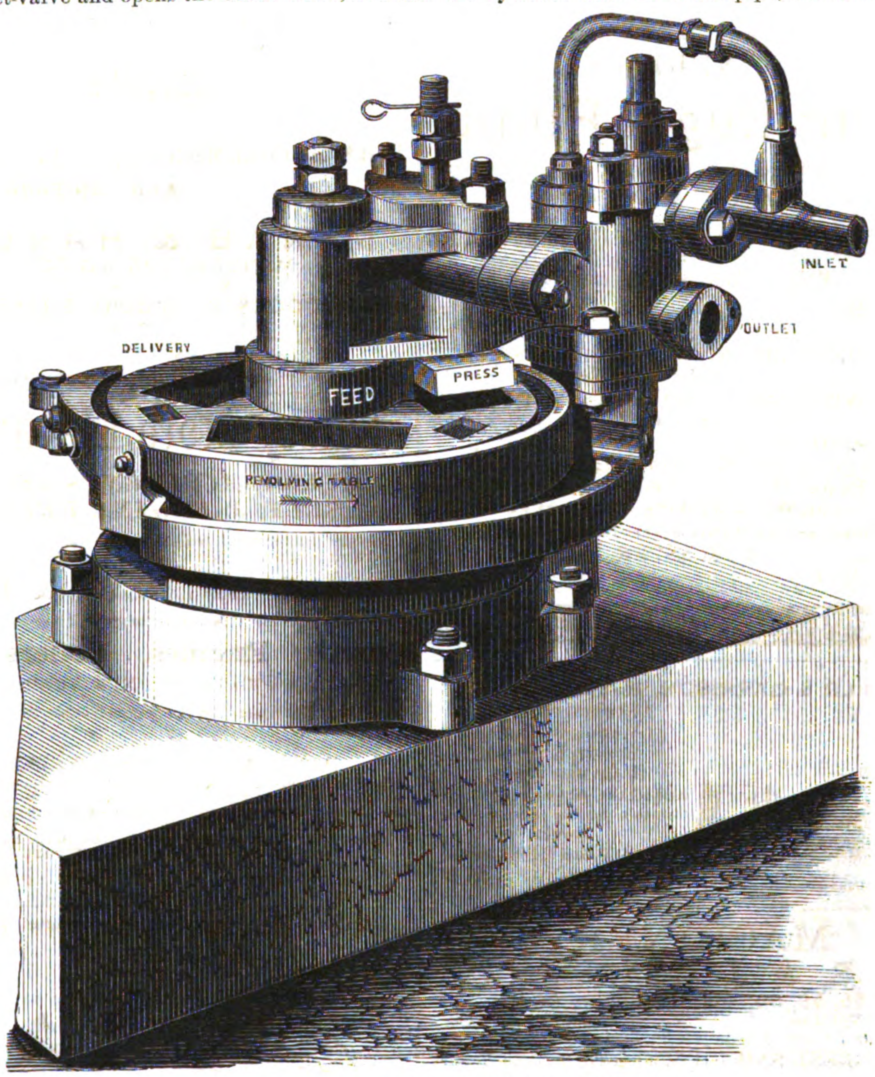
Hydraulic Brick-making Machine.

THE applications of hydraulic power are manifold, and have evidently not yet reached the limit either of usefulness or variety. Indeed, there is little doubt that the hydraulic press could be advantageously substituted, in many cases, for more complex mechanical agencies now commonly used. We herewith present an engraving, taken, with the accompanying description, from the *Engineer*, which shows a use of hydraulic pressure unfamiliar to many in this country, and which is claimed to possess substantial merits over those of the more ordinary construction :—

"The machine consists of a revolving table containing three moulds, and also of as many pressing cylinders with their accompanying rams and plungers. This table is made to revolve intermittently in the direction shown by the arrow. This intermittent motion of the table is effected by means of a loose ring fitted so as to work freely round the circumference of the table. This ring has three cam-shaped notches cut in it, which fit on to three anti-friction rollers mounted on pins fixed in the table. This ring has a reciprocating motion imparted to it from a small water cylinder and ram—not shown in engraving—the cam-shaped notches being so formed that on a reciprocation of the ring in one direction they cause the table to be moved forward one-third of a revolution ; whilst during the return movement of the ring the notches cause the ring to be forced upwards or elevated by the ring riding upon the anti-friction rollers attached to the table, which is held fast by a ratchet pawl entering into one of three notches in the table. This upward motion of the ring actuates the distributing valves for admitting the water to the working parts of the machine.

"These working parts consist of direct-acting pistons and rams carrying plungers or pressing blocks, the pistons, rams, and cylinders being kept water-tight by hydraulic leather packing.

"The action of the machine is as follows :—On the feed-mold being charged with clay from the hopper or pug-mill placed over the table, it is carried forward by the ring one-third of a revolution, thus presenting the contents to the pressing action of two plungers actuated by separate pistons and rams—one plunger being forced downwards upon the upper surface of the brick, whilst the other is being forced upwards or against the under side of the brick, both situated and working in a cylinder cast with the bed of the machine ; thus the brick is effectually pressed. The fall of the ring closes the inlet-valve and opens the outlet-valve, and the pressing plungers are brought back again to their original position clear of the table, which is free to be moved forward another third of a revolution, thus bringing the mould containing the pressed and molded brick over and opposite to another plunger placed in the lower bed of the machine and called the delivery-plunger, and also a fresh charge of clay is submitted to the pressing plungers. Simultaneously with the *pressing* of a brick, the *delivery* of an already pressed brick is accomplished, the already pressed brick being forced out of the mold by a water-actuated plunger to the surface of the table, whence it is removed for burning or drying. The return motion of *all* the plungers is effected by the water pressure, which is always retained constant in annular spaces formed by the difference in area of the pistons and rams in their respective cylinders, so that on the pressure being removed from the larger or full area of the pistons, the constant pressure on the small area or annular space forces the water from the opposite side of the cylinder into the waste-pipe, and thus brings the rams and plungers to their original position. The mold thus emptied by the delivery-plunger is again filled with clay from the hopper, so that three bricks are molded, pressed, and delivered during one complete revolution of the machine. Regulation nuts are placed on the rams for regulating their respective strokes, thus controlling the thickness of the molded article. The water-pressure is conveyed to the different cylinders in passages formed in the castings. This machine appears to us to possess numerous advantages, recommending it to the attention of all interested in the manufacture of bricks."



HYDRAULIC BRICK-MAKING MACHINE.

American Inventions Abroad.

Governor.—W. E. Simonds, Hartford, Conn.—Two pulleys on the same shaft, one of which is the frustum of a cone of the same diameter in the center of its length as the other, which is of regular construction, are driven by belts from the same drum. The pulley of regular form drives the shaft by a pin driven through from its surface into a slot, leaving the shaft free to move lengthwise. This pulley also drives a common ball-governor controlling the sidewise movements of the belt which drives the conical pulley, so that, when the balls rise, the belt moves to the small end of the pulley, and *vice versa.* The conical pulley has a female screw fitting on a male screw on the shaft, and when it runs faster than its fellow it will move the shaft lengthwise, so as by means of proper connections to shut off the supply of power till the speed is reduced, and *vice versa.*

Centrifugal Machine.—S. S. Hepworth, Yonkers, N. Y.—A method of attaching and suspending the basket and curb of a centrifugal machine to the frame or support, and details of construction to avoid jar and vibration. This relates to a centrifugal machine in which the basket and its shaft turn in fixed bearings, forming part of the curb or its frame, so as to be always concentric with it, and in which the basket and curb so connected is suspended by a ball and socket, or other flexible joint, at the end of the shaft most distant from the curb, and at the curb is held laterally by elastic connections.

Gang Plow.—L. Chapman, Collinsville, Conn.—This plough has two wheels with an axle sunk somewhat below the center of the wheels. To the center of the axle a plate of metal is attached, to the top of which another plate is pivoted, so as to be free to revolve horizontally thereon. To the top of this last plate a standard is attached open up through the center. A block slides on ways vertically in this open center, and by means of a collared swivel supports the plow-beam, which extends both ways equally from the axle, and has two complete sets of right-and-left-hand plows on opposite sides; either set can be put at work by means of a worm hung in bearings on the sliding-block and meshing into a worm-wheel on the swivel. The sliding-block can be lifted up, so that the plows will clear the ground, by a small hydraulic jack attached to the standard and sliding block. The plate to which the standard is attached is revolved horizontally on the plate beneath by a worm attached to the upper plate and teeth for the same on the lower plate. To the front end of the beam a gauge-wheel is attached, and also the arc of a circle in metal, whose center is the center of the beam, and on it is a sliding clamp attached to a draw-bar, whose rear end is attached near the center of the beam. The power is attached to the front of this clamp. After the plow has been across the field, the whole gauge is turned round, the plows lifted and turned over, then swung horizontally into position, and it is ready to go straight back across the field and leave no dead furrow.

Fire and Burglar Proof Safes.—J. Farrel, New York City.—The outer metallic wall and the door of the safe are of several plates of welded high and low steel, or steel and iron, franklinite or spiegeleisen, and wrought-iron; and the bolts and spindles of franklinite combined with steel or iron. To guard against the introduction of explosives, all seams and joints have elastic packing. The hinge-pin of the door is made so to move that the tongue and groove will not bind. To prevent injury of the contents, the door is lined with non-heating substance.

Industry of Cohoes, N. Y.

THE following concerning this—one of the most thriving manufacturing towns in the United States—is taken from the New York *Tribune* :—

"As late as 1830, there were not fifty inhabitants in what is now the principal manufacturing portion of Cohoes. In 1845, the population had increased to 2,000, and in 1847 to 4,000 persons. The place was incorporated as a village in 1848. In 1866, the population was 10,000; at present the city numbers over 16,000 inhabitants. Its manufactories comprise six extensive cotton-mills, running 203,000 spindles, eighteen large knitting-mills, two foundries, three machine-shops, a rolling-mill, two ax factories, a planing-mill, a sawing and beveling establishment, and many other large and flourishing industrial concerns. The aggregate capital invested in manufacturing operations is estimated at $20,000,000. With such a record, Cohoes is well worth a visit. Her history in detail points a moral in the cause of protection and industry which he who runs may read.

THE UTILIZATION OF THE WATER-POWER.

"The 'carry' around the Falls of the Mohawk, commonly known among the Indians as Cohoes Falls, took its name from the Indian word *cohoos*, meaning fall of a canoe, which was originally the designation of the old Indian village. The present city clusters around the same falls, and owes its prosperity to the great water-power which they furnish. The water-power was made useful in the very early days of the village for grist-mills and saw-mills; but no extensive attempt at manufacturing was made until 1811, when the Cohoes Manufacturing Company was incorporated 'for the purpose of manufacturing cotton, woolen, and linen goods, bar-iron, nail-rods, hoop-iron, and ironmongery.' The goods manufactured here at the present time are all included in the schedule given in the act of 1811; but it is doubtful whether the projectors of that enterprise dreamed of the immense knitting-mills whose undershirts, drawers, and stockings have superseded hand-made goods almost entirely. This company failed after struggling for many years; the burning of their factory in 1827 giving the finishing stroke to their already disordered affairs. They took power from a dam built out in the river below the falls; and they were evidently far ahead of the times, as even in 1831 the entire population of the neighborhood did not exceed 150 persons. In 1831, Mr. Hugh White built a mill which was one of the first to draw its power from above the falls. In 1832, Mr. David Wilkinson came to Cohoes from Pawtucket, Rhode Island, and became one of the pioneer manufacturers. He was a man of great energy and force of character, and to this day there remain evidences of his foresight. Unfortunately, business difficulties drove him away.

"Up to this time the Cohoes Falls had been principally celebrated for their romantic beauty. Their industrial value now, of far greater consequence, presents in the city of Cohoes an enduring monument of their value. To utilize their great natural advantages, a company was organized in 1826, taking the same name as its predecessor, the Cohoes Company. Its original capital, $250,000, was increased by subsequent enactment in 1833 to $500,000. The company added to their original purchase of real estate from time to time, and now own the entire water-power of the river, from half a mile above to one mile below the falls, with a total fall of 120 feet. The present stone dam was built in 1865, and is a substantial structure, 1,443 feet long, costing $180,000. By its means the entire waters of the Mohawk can be diverted from their natural channel and impressed into the service of the manufacturer. The water was and is used in five successive canals, and is again used from the level of the State dam, which is below the falls, and was built to furnish water to the State canal at this point. In 1834, the Cohoes Company built their first canal, 1¾ miles long, with a fall of 18 feet. In 1843, the company constructed a second, ⅓ of a mile long, with a fall of 25 feet. The same year a third canal was brought into use, ½ mile in length, with a fall of 23 feet. The fourth and fifth canals are each 20 feet fall; the sixth is from the level of the State dam. It will thus be seen that the water is used six different times. The company lease this water-power at $20 per horse-power per annum, including a quantity of land proportioned to the power taken. Only the largest mills require 100 horse-power, which is obtained at the low cost of $2,000 per annum, or less than one-third the cost of steam. The Cohoes Company have been progressive. Their first dam, built in 1831, was of wood. It was carried away in the following year, and a second of the same character shared the same fate in 1839. This was immediately rebuilt, but not until 1865 was the present admirable structure completed. This company supply all the motive-power used in the city, and are utilizing at the present time about one-half of their available power, say 5,000 horse-power. They purpose to extend and multiply their canals so as to make double this amount subservient to their purposes.

THE COTTON FACTORIES.

"The Harmony Mills are the largest in Cohoes, and comprise six distinct and independent factories, which attract attention as one approaches the city, and are among its most prominent features. The corporation dates back to 1835, with varied changes until 1850, when the property was sold out. In 1851, the present Harmony Mills Company was incorporated, and the factories have continued under the same management ever since; the capital is $2,000,000. The mills of this Company are:—Mill No. 1, 550x70 feet, four stories; Mill No. 2, 660x75 feet, three stories; Mill No. 3, 675x70 feet, five stories; Old Harmony, 150x50 feet, four stories; Ogden, 500x50 feet, five stories; Strong, 200x50 feet, four stories; Mill No. 4, 530x70 feet, five stories.

"Mill No. 4, now in course of erection, will contain 1,200 looms and 55,000 spindles, and will be supplied with all the latest styles of machinery to make cotton printing cloths one yard wide of the same texture as those of the English mills. This mill will be the first in the United States to make this kind of goods. The Harmony Company own all the cotton-mills in Cohoes, and have in the aggregate at the present time 230,000 spindles and 4,400 looms, and employ 3,100 hands, two-thirds of whom are women and girls. Up to July 1, 1871, the Company had expended for machinery $1,750,000, and for real estate $2,275,000. During the month of September last, they turned out 5,265,198 yards of cotton cloth. Their average monthly product is 5,500,000 yards. They manufactured 52,342,000 yards, worth $4,053,254, last year. In making this large amount of goods they consumed 9,012,000 pounds of cotton, worth $2,545,887; 150 tuns of starch, and 3,000 tuns of coal,

worth $21,000, the latter used for heating the mills; and they required the constant daily use of 3,000 horse-power, conveyed to their machinery over fifteen water-wheels. The value of articles classed merely as 'sundries' used in manufacture amounted to $282,500. During the six months from January to July, 1871, the wages of the hands amounted to $442,000; during the year 1870, $855,350. The company own large store-houses, and are now erecting a large brick depot on the New York Central Railroad, 200x55 feet, which will hold 15,000 bales of cotton. This is to accommodate the large shipments made to the company. Last winter 16,700 bales were received in November and December.

THE KNITTING MILLS.

"The prominent articles manufactured in this city, and which have made it well known through the country, are the woven undershirts, drawers, and stockings, all comprehended under the name of knit goods. These garments are made up from the cloth, which is knit for the purpose by machinery, and after being cut is sewed by sewing-machines. When the garment is woven to fit, it comes under the head of 'full fashioned goods,' articles principally made in New Brunswick, N. J., and competing successfully with the same styles of imported goods. The eighteen large knitting-mills of Cohoes are of comparatively recent construction, and the industry which thrives in them is indeed in its infancy. Mr. Charles H. Adams, late President of the National Association of Knit Goods Manufacturers, says: —'The principle of knitting by power was first successfully applied in this country. It was first attained in 1832, although nothing of importance was accomplished until 1841. The whole production at that time did not exceed $40,000. Now, we estimate our production at half as many millions.' Cohoes inaugurated the knitting business in this country, and now produces one-third of all the hosiery manufactured in the United States. Egbert Egberts was the pioneer of the knitting business, and began the manufacture as early as 1832, in a small way, which gradually grew, so that in 1836 he increased his mill, and in 1850 erected the Watervliet Mill, which was run by Mr. Charles H. Adams until 1862. In 1863, Mr. Adams built the factory known as the Adams Mill, which is one of the finest in the city."

According to the United States census just completed, there are here devoted to this industry eighteen mills, having an aggregate capital of $1,157,000, using 1,066 horse-power, paying annually $535,362 in wages, working up raw material to the value of $1,394,948, and turning out finished products to the amount of $2,345,226 a year.

OTHER GREAT INDUSTRIES.

"The Cohoes Rolling Mill occupies an area of 500 by 160 feet. It produces shafting, bar, and band iron, together with a superior quality of ax, pick, and mattock poles, made in a peculiar way by an ingenious machine, which turns out twenty perfect ax-poles a minute. Here also is made a superior iron for tool-makers, which is said to have taken the place, to some extent, of the Norway iron formerly used. Last year this establishment used 28 tuns of pig-iron, worth $85,000; 500 tuns scrap, worth $20,000; 5,000 tuns of coal, worth $30,000; and 'sundries' to the amount of $40,000. The product was 2,500 tuns band iron, and 8,000 ax-poles, worth in all $299,000. Among similar concerns here are Messrs. Weed, Becker & Co., and the Ten Eyck Ax Manufacturing Co., producing last year $270,000 and $110,000 worth of goods respectively. The Empire Pin Company, of Messrs. Harns Brothers, with a capital of $25,000, used up last year 100,000 bundles of brass wir worth $24,000, and produced 175,000 packages of pins, of a value of $38,359. They are now building a new factory 40x100 feet, to be six stories high. Messrs. H. Dawson & Son own the Cohoes Knitting-needle Factory, which turned out last year 2,804,000 dozen needles, worth $14,450. The Cohoes Paper Company, the Cohoes Iron Foundery and Machine-shop, the Cohoes Straw-board Mill, the Bedstead Factory, and the Magnolia Tape Mills are additional evidence of the variety of industry here."

COMMUNICATIONS

TO CORRESPONDENTS.

We wish our readers to understand that, in freely publishing communications, we do not hold ourselves responsible for the opinions of our correspondents, inasmuch as we may occasionally publish views opposed to our own.

MESSRS. EDITORS:—Knowing that you are interested in all of the improvements of the day, I have been thinking that a few lines concerning a branch of industry the products of which find a place in every department of life, would be acceptable as an article for your paper. I have no recollection of seeing anything upon the subject in your journal; yet there are millions of capital invested in the manufacture of brushes in this country. Until within a very few years, all brushes were made by hand labor. Within a few years past the manufacturers have brought machinery into their factories to do the woodwork of the brush. That being done, it created a demand for a more expeditious way of "drawing" the brush.

For some years prior to 1866, there had been attempts to construct a machine to draw brushes. But the old method of drawing with a fine continuous wire was adhered to, which was found impracticable, and therefore was abandoned by the projectors.

But the irrepressible spirit of invention kept at work, and in the fall of 1865 a Mr. A. M. White, of Portchester, N. Y., gave the matter his attention. After some study on the "draw," he came to the conclusion that a machine had not *judgement* enough to handle the fine continuous wire to make it practical. Then came the thought, if the machine will not draw, can it not be made to "set"? The new idea followed out proved to be a success. A brush was made with a solid back, with a separate fastening for each knot, thus at one stroke doing away with the cost of an extra piece or covering for the back, the separate fastening allowing the block to be a solid one, and making a brush that could be made wholly by machinery, from the rough material to the finished brush. While relating these facts, Mr. White showed me the first (as he believes) solid backed brush, fastened by wire, that was ever made. The next thing was a machine that would "set" the knots, and compete successfully with cheap hand labor. That was also accomplished by Mr. White in the summer and fall of 1866, and the machine placed on exhibition in this city, running by steam power, for nearly three months. It was visited and approved by the principal brush manufacturers in the city. It is in my opinion one of the greatest inventions of the times, and the credit is due to Mr. White for the invention of the first *practical* machine for making brushes, or the first that has made them at a profit. The machine sets the knots in any material that can be bored, with the same facility, the only difference being in boring the holes. Leather, ivory, steel, hard rubber, or brass may be used if desired. The harder the material, the better the fastening holds. The machine is automatic in its operation, only requiring an attendant to place the block in the machine and supply the feeder with the bristles, each machine setting two to three gross per ten hours. One machine has set as high as 55,000 knots in ten hours, which would be over ninety per minute. It is certainly one of the most ingenious yet practical machines ever brought out.

Mr. White's invention has been an incentive for others to work in the same direction. I understand that a Jersey inventor has brought out a machine for the same purpose, though with a different fastening, but not having seen it, I can give you no description. And still another machine has been brought out in the year past, and was exhibited at the last Fair of the American Institute by the Woodbury Brothers, of this city. It is a very ingenious piece of mechanism. They also use the solid block, the wire forming a screw on the knot as it is thrust in. But I will not trespass further upon your columns. But after seeing how the minds of men are making inventions, and others adding to them, I could hardly help saying what I have. W. A. M.

NEW YORK CITY, Jan. 22, 1872.

The Weekly Evening Mail.

WE are pleased to note that the *Evening Mail*, one of the very best of the New York City dailies, has begun the issue of a weekly edition. This comprises judicious selections from the interesting matter of the daily publication, including correspondence, by able writers, from different parts of the world, literary notes, editorial comments on current items, as well as elaborate articles on topics of more prominent public importance, a farmer's department, and another for the young folks. Also, not least among the rest, a well-digested résumé of the news, and full and accurate quotations of the markets, with a list of New York prices on the day of publication. It is an eight-page paper, containing forty-eight columns, and sent to subscribers at $2 50 per annum, which also secures a premium picture. Liberal inducements for clubs are also offered. The publisher is Robert Johnson, No. 34 Park Row, New York City.

Railways in Egypt.

THERE exist at present in Egypt 652 miles of railway. Of this 131 miles are double line, and of the rest 341 miles of single track are in Upper and 180 miles are in Lower Egypt. From Alexandria on the west to Ismailia on the east, the system spreads itself delta-wise, converging on Cairo towards the south on the east bank of the Nile, while on the opposite side of the river from Embabeh to Minieh the line follows the river-bank, with two short branches—one to Fayoum, 25 miles long, and a second to Abd-el-Ouakf, 4 miles in length. The double line is the through railway from Alexandria to Cairo.

THE TEMPERATURE TRANSMITTED BY INCLINED INCANDESCENT RADIATORS.

BY CAPTAIN JOHN ERICSSON.

[From *Engineering*.]

THE notion has long prevailed that the surface of an incandescent body projects rays of equal energy in all directions. Laplace, having full confidence in the correctness of this assumption, founded upon it the well-known demonstration proving that the radiant energy which emanates from the receding surface of the sun possesses greater intensity than that emanating from the central regions of the luminary. But actual observation having shown that the radiant energy from the sun's border, so far from being more intense, is considerably less than from the center, the persistent mathematician was driven to the alternative of proving that the retardation produced by the sun's atmosphere neutralizes the assumed increase of intensity of the radiation emanating from the receding solar surface. How completely the ready symbols, manipulated by the great master, establish the truth of his proposition, will be found on reference to "Mécanique Céleste," tome iv., pp. 284–288; the result of the demonstration being that the solar atmosphere absorbs $\frac{11}{12}$ of the entire energy emanating from the radiant surface! Evidently Laplace did not regard solar radiation as molecular energy capable of being converted into dynamic energy, or he would have perceived the impossibility of $\frac{11}{12}$ being absorbed by the solar atmosphere. It is not intended to enter on a criticism of the famous demonstration, but the question is so intimately connected with the subject under consideration that a brief reference to the main points will be necessary to show on what grounds the conclusion was based that, but for the retardation produced by the solar atmosphere, the radiant energy of the luminary would be increased in the ratio stated. Accepting Laplace's assumption that the intensity of the radiation increases with the obliquity of the rays (owing, it is supposed, to the increased number of rays contained in a given section), we must admit that the radiant energy from the regions near the sun's border will be greatly enhanced. And since it has been found by actual observation that no increase of intensity takes place, the inference cannot be resisted that the retardation produced by the solar atmosphere neutralizes the increased intensity occasioned by obliquity. It is evident that this retardation may be determined by calculating the assumed increase of intensity corresponding with the obliquity of the rays; but this calculation, it is also evident, will not show the full extent of retardation, since not only is there no increase but a considerable *diminution* of intensity towards the sun's border. Hence, the amount of retardation determined agreeable to the theory that the radiant intensity is increased by the obliquity of the rays will be still further augmented. The reader will readily perceive from this brief explanation on what grounds Laplace's amazing enunciation is chiefly based, that "if the sun were stripped of its atmosphere, it would appear twelve times as luminous."

The foregoing reference to theories promulgated nearly a century ago, when solar radiation was but imperfectly understood, will be deemed irrelevant by those who have not made themselves acquainted with the contents of the recent work on the sun by Père Secchi ("Le Soleil," P. A. Secchi, Paris, 1870). This eminent physicist, who has devoted more time to the investigation of the subject than any one else, now presents calculations proving that the retardation offered by the solar atmosphere to the passage of the rays is so great that only a fraction of the radiant heat enters space. He sums up his investigation by the following positive statement: "1st. At the center of the disk, perpendicularly to the surface of the photosphere, the absorption arrests about $\frac{2}{3}$, more exactly $\frac{63}{100}$, of the total energy. 2d. The total action of the absorbing envelope of the visible hemisphere of the sun is so great that it allows only $\frac{12}{100}$ of the entire radiation to pass, the remainder, that is to say $\frac{88}{100}$, being absorbed." Persons accustomed to compare mechanical equivalents, especially those who possess practical knowledge of the amount of mechanical power developed by the radiant heat emitted by incandescent bodies, cannot consistently accept Père Secchi's theory. Nor will the assumption that the radiant heat is absorbed by molecular motion in the solar atmosphere be accepted by those who take the practical view of the matter that the dynamic energy developed by the heat-rays projected from the photosphere must enter space, less only the amount of work performed during the passage through the solar atmosphere. Investigations conducted by means of the solar calorimeter (described in *Engineering*, July 15, 1870)* show that when the earth is in aphelion, the dynamic energy of the sun's radiant heat on entering the earth's atmosphere is 6·35 thermal units per minute upon one square foot of surface. The dispersion of the rays when the earth is in the position referred to being in the ratio of 1 : 47,567, it will be seen that each square foot of the photosphere emits at least $47{,}567 \times 6{\cdot}35 = 302{,}050$ units of heat per minute. Secchi says that only one-eighth of the heat emitted passes through the sun's atmosphere. Accordingly, $7 \times 302{,}050 = 2{,}114{,}350$ units per minute are absorbed. Now the development of one horse-power requires $\frac{33000}{772} = 42{\cdot}7$ units of heat per minute; hence the energy supposed to be absorbed represents a *continuous* dynamic force amounting to $\frac{2114350}{42{\cdot}7} = 49516$ horse-power for each square foot of the surface of the photosphere. Considering that the sun's atmosphere is composed of highly attenuated gases, containing a very small quantity of matter, probably not much more on a given area than the terrestrial atmosphere, the assumption that the stated enormous energy is continually being arrested by the solar atmosphere, is utterly at variance with the principles of mechanics. But as it is not our intention on this occasion to combat the erroneous, not to say absurd, doctrines relating to solar heat contained in the pages of "Le Soleil," let us at once proceed to investigate the subject of radiant heat emanating from incandescent bodies. If we can prove the fallacy of the assumption that radiators emit heat-rays of equal energy in all directions, we destroy the principal foundation supporting the false theory which has led to the conclusion that only one-eighth of the energy developed by the sun penetrates its atmosphere. The subject will be presented in two sections:—1st. Radiant heat emanating from inclined incandescent planes. 2d. The radiation of incandescent spheres—the first section only to be discussed in the present article.

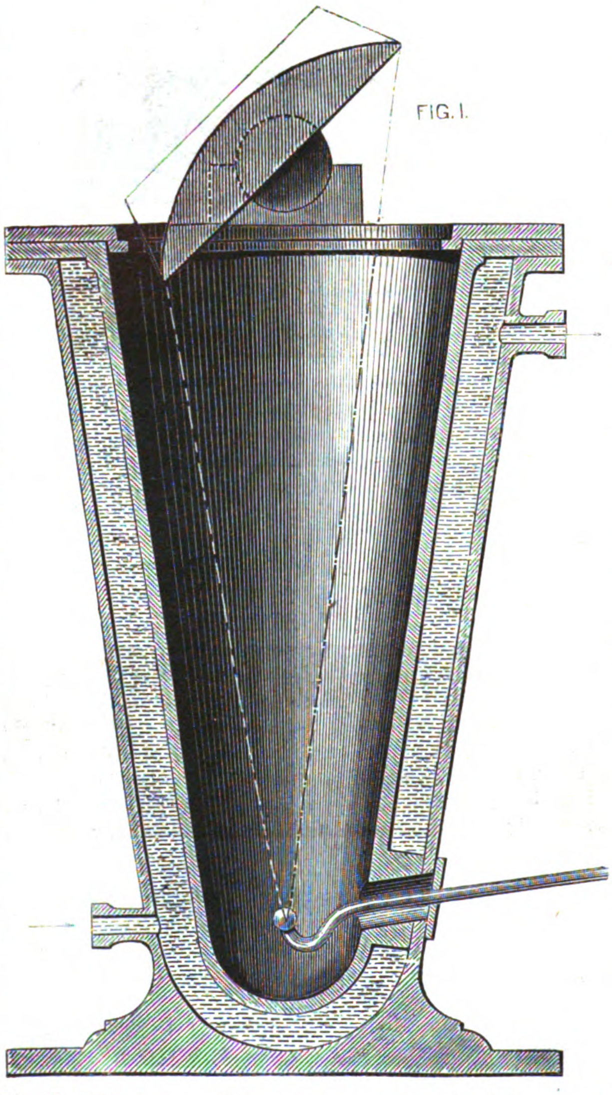


FIG. I.

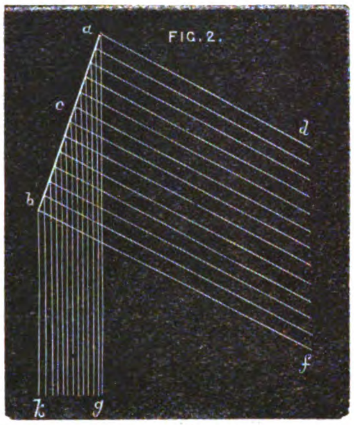
The reader is aware that the experiments relating to the radiant heat of solid bodies, an account of which has previously appeared in *Engineering*, were so managed that the atmospheric air was excluded from the radiator and from the thermometer employed. The radiation of flames, it has been shown in previous articles, cannot be ascertained within a vacuum, nor is it easy to confine solid *incandescent* radiators of large size within an exhausted vessel, while ascertaining their radiant power. Some expedient, therefore, must be adopted to prevent the disturbing influence of the surrounding air on the recording thermometer, when experimenting within a vacuum is not practicable. Evidently this can only be effected by keeping the air surrounding the bulb in a perfectly quiescent state. The following description will show the device which has been resorted to.

Fig. 1 represents a vertical section of a conical vessel, the bottom of which is semispherical, the top being open and provided with a wide flange. A broad ring with journal bearings attached on opposite sides is bolted to the flange mentioned; a circular disk of cast-iron, the back of which is semispherical, being suspended across the top of the conical vessel, supported by journals resting in the bearings adverted to. A jacket, through which a

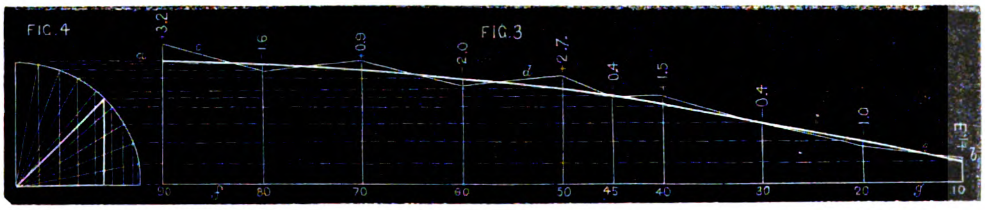
* See pages 83, 84, Vol. XI., AMERICAN ARTISAN.

stream of cold water is passed during experiments, surrounds the conical vessel, the recording thermometer being inserted near its semispherical bottom. The tube of the thermometer is bent in order that the entire upper half of the bulb may be exposed to the radiant heat of the circular disk, while the lower half is inclosed in a casing composed of non-conducting materials. It scarcely needs explanation that the air within the semispherical chamber containing the thermometer will remain in a quiescent state, since the heat is applied from above. The cold air at the bottom obviously cannot be replaced by heated air from the top. At the same time, the trifling amount of heat carried downward by conduction, from particle to particle of the confined air, will be completely absorbed by the surrounding cold vessel. Consequently, the action of the inclosed thermometer will be sufficiently undisturbed to afford reliable indications. The inclination of the radiating circular disk is regulated by a graduated quadrant and an index secured to one of the journals, in such a manner that it may be readily detached and again applied. A casing, likewise readily secured and detached, is applied to the disk in order to prevent radiation from the semispherical back towards the thermometer, when the inclination is great. During experiments the apparatus is placed near an air furnace, hose being attached for supplying a constant stream of water through the jacket. The furnace having been charged with combustibles capable of producing a steady fire, and heated to the requisite degree, the disk is inserted. Having remained in the furnace until the color of the metal approaches bright orange, the disk is quickly withdrawn, and placed over the open conical vessel, supported by the journals, as shown by our illustration.

Agreeably to the theory, the correctness of which we are going to disprove, the incandescent disk, placed at the inclination shown in Fig. 1, will transmit a higher temperature to the thermometer than if it were placed at a greater angle to the vertical line; the reasons assigned for this assumption being that the same number of radiating points are presented by the disk, and the same number of rays of equal energy emitted, in either position, while in their form they are more concentrated than in the latter. This explanation involves the proposition that parallel rays projected at an acute angle, from a given number of radiating points, transmit *greater* intensity than an equal number of parallel rays projected at a less acute angle to the radiant surface. That this proposition, although untenable, is very plausible, will be seen by reference to Fig. 2. Let *a b* represent the inclined radiant surface, and *a c b* the several radiating points projecting heat-rays towards the spaces, *d f* and *k g*. The number of radiating points and the number of heat rays projected, being alike in each case, while the space represented by *k g* is only one-third of that represented by *d f*, it must be admitted, if we assume all rays to possess equal energy, that the concentration of heat within *k g* is three times greater than within *d f*. In other words, that a given area within *k g* receives three times more heat than an equal area within *d f*. This apparently correct view of the question, and its application to spheres, led Laplace astray in his demonstration concerning solar intensity. In the second part of our discourse, which, as already stated, will be devoted to incandescent spheres, the influence of the spherical form on radiant intensity will be fully considered. In the meantime, we must admit that the demonstration contained in Fig. 2 is unanswerable under the stipulated condition that all heat rays emitted by a radiator possess equal energy. Our task, therefore, will be to show, practically, that the stated condition is based upon untenable ground. Having already made ourselves acquainted with the apparatus constructed for this purpose, we may at once proceed to consider the results of the experiments which have been instituted. It will be evident that, owing to the high temperature of the disk, it will cool



very rapidly after being removed from the furnace and placed in position over the conical vessel, and that the thermometer, however sensitive, will require so long a time before reaching maximum indication, that only one inclination can be experimented on at a time, thus rendering reheating indispensable for each change of inclination. The number of changes of inclination during the investigation have, therefore, been limited to ten, beginning with 90° and ending with 10° inclination



to the vertical line. It will also be evident that the high temperature renders it practically impossible to impart exactly the same degree of incandescence at each operation. The best that can be done is to maintain the furnace at a uniform temperature, and to expose the disk to the action of the heat during an equal time for each operation. This method, though not precise, has, it will be shown, conclusively established the fact that the temperature transmitted to the stationary thermometer by the radiant heat, varies in the exact ratio of the sines of the angles formed by the face of the disk, and a line drawn from its center through the center of the bulb. The result of an experiment made with great care will be found recorded by the diagram, Fig. 3, in which the ordinates of the curve, *a b*, represent the sines of the angles formed by the disk and the line mentioned, the ordinates of the irregular line, *c d e*, representing the temperature transmitted to the stationary thermometer. The figures inserted below the base line, *f g*, show the number of degrees of inclination corresponding with the sine represented by each ordinate, while the figures above the curve, *a b*, show the discrepancy between the calculated and the actual temperature transmitted to the stationary thermometer. It will be found on inspection that the mean difference of the actual and the calculated temperature *above* the curve is 1·94°, that *below* the same being 1·08°; hence the mean discrepancy is only 0·86° Fahr. Considering the difficulty of imparting an equal temperature at each operation during the experiments, this discrepancy between the calculated and the actual temperature transmitted by the radiation of the incandescent disk is unimportant. We are compelled, therefore, to accept the conclusion that the temperatures vary *exactly* as the sines of the angles of inclination of the radiant surface. It has been deemed proper, in view of the great importance of this conclusion, and in order to render the subject clearly understood, to introduce Fig. 4, showing the several angular positions of the incandescent disk during the investigation. Dotted lines, it will be seen, have also been introduced connecting these angular positions with the corresponding ordinates of the curve, *a b*, in Fig. 3. A mere glance at the geometrical representation contained in Figs. 3 and 4, will show that the temperatures indicated by the curve correspond exactly with the sines of the angles of inclination of the disk. Bearing in mind the facts thus established, let us again refer to Fig. 2, in which the space, *k g*, is one-third of the space, *d f*. We are now enabled to demonstrate that the temperature within the former will be only *one-third* of the temperature within the latter. Laplace and his followers, assuming the reverse to be the case, viz., that the temperature within *k g* will be three times higher than within *d f*, their estimate of the radiant intensity of inclined surfaces will obviously be too high in the inverse ratio of the sines of angles of inclination. The consequence of this grave mistake, with reference to the radiant power of incandescent spherical bodies, will be discussed in the next article on radiant heat.

NEW YORK, December 15, 1871.

Obituary.

WILLIAM GREENLEAF CRANCH, the oldest clerk in the Patent Office, died suddenly on January 26 from pneumonia. Mr. Cranch was seventy-six years old, and had been employed constantly in the Office since 1844, and was connected with it at intervals long before that time. The life tenure which he held in our unstable service was given him by the common consent of the various Commissioners under whom he served, partly because he had no ambition to make him any man's rival in advancement, but chiefly as a tribute to his faithfulness and integrity. He was charged with the care of the caveat files, and, his duty requiring strict confidence, he came, after fifteen years spent in the same labor, with the approaching weakness of age, to consider his position as one of the greatest importance. His slight figure and long, snowy ringlets sweeping down over his shoulders, attracted the attention of all whose business called them to the Chief Clerk's room.

ERRATUM.—Our printers and proof-readers are of the best, but they are not infallible. For example, in the description of Mr. J. F. Tallant's Circular Slide Valve on page 56, current volume of the AMERICAN ARTISAN, the date of the patent was given as Nov. 14, 1861, whereas it should have been Nov. 14, 1871, or just ten years later.

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123,196.—THILL-COUPLING.—George W. Pilson, Towsontown, Md. Ante-dated Jan. 25, 1872.
123,197.—CHUCK FOR SCREW CUTTING LATHES.—Eugene C. Plimpton and Samuel Taylor, Bridgeport, Conn.
123,198.—TELEGRAPHIC INSULATOR AND BRACKET.—John Robertson, Carbondale, Pa.
123,199.—SELF-ACTING MULE FOR SPINNING.—Feargus O'Connor Robinson, Fall River, Mass.
123,200.—MACHINE FOR FORMING HAT-BRIMS.—Charles T. Rowe, Norwalk, Conn.
123,201.—MACHINE FOR MAKING BARREL-HEADS.—Gottfried Schloemer, Greenfield, Wis.
123,202.—BLACKSMITH'S FORGE.—Melchi Scott, Fairfield, Iowa.
123,203.—PUMP.—Robert T. Smart and Robert T. Smart, Jun., Troy, N. Y.
123,204.—BLACKING-BOX.—Hiram Smith, Newton Mills, Haddonfield, N J
123,205.—INKSTAND.—John Charles Sparr, Irondequoit, assignor to himself and Julius Schneider, Rochester, N. Y.
123,206.—DRAWING-KNIFE.—Albert M. Steele, assignor to himself and Frederick A. Hull, Danbury, Conn.
123,207.—CAR-COUPLING.—Henry C. Swan, assignor to himself and B. F. Gray, Washington, D. C.
123,208.—LANTERN.—Charles J. Sykes, Chicago, Ill.
123,209.—GIG SADDLE-TREE.—Samuel E. Tompkins, Sing Sing, N. Y.
123,210.—LOOM.—Alwill Urbahn, Paterson, N. J.
123,211.—SAWING MACHINE.—William Weaver, Greenwich, N. Y.
123,212.—UPRIGHT-PIANO FRAME.—Justin Whitney, Boston, Mass.
123,213.—CARRIAGE-BODY.—Edgar M. Williams, assignor to Theodore Comstock, Columbus, Ohio.
123,214.—TOBACCO-PIPE.—Clarington A. Wright, Milwaukee, Wis.
123,215.—TEA-KETTLE SPOUT.—James Ash, Sterling, Ill.
123,216.—SEED-PLANTER.—Eli F. Ballard, Lincoln, Neb.
123,217.—MACHINE FOR SAWING STONE.—Valentine G. Barney, Minneapolis, Minn.
123,218.—REVOLVING WHIFFLETREE CLEVIS.—William Beers, Milan, Ohio.
123,219.—WOOD PAVEMENT.—George A. Beidler, Philadelphia, Pa.
123,220.—COMPOUND SALVE OR PLASTER FOR THE CURE OF CANCERS.—Henrietta J. Bendall, Jarrett's Depot, Va.
123,221.—SPINNING MACHINE.—George Bernhardt, Radcliffe, Great Britain.
123,222.—MECHANISM FOR DOFFING AND APPLYING BOBBINS IN SPINNING MACHINES.—George Bernhardt, Radcliffe, Great Britain.
123,223.—SAWING MACHINE.—George S. Birge, Drayton Plains, Mich.
123,224.—HEDGE-TRIMMER.—John Black, Eureka, Ill.
123,225.—COOKING-STOVE.—Nathan O. Bond, Fairfax Court House, Va.
123,226.—WASH-BOILER.—Edward E. Brewster, Holly, Mich.
123,227.—WASH-BOILER.—Edward E. Brewster, Holly, Mich.
123,228.—BAND-TIGHTENER.—George Brodie, Jefferson County, Ark. Ante-dated Jan. 20, 1872.
123,229.—HORSE-POWER.—George Brodie, Jefferson County, Ark. Ante-dated Jan. 19, 1872.
123,230.—STEAM OVEN.—Edmond Brown, assignor to himself and Roswell Little, Burlington, Vt.
123,231.—HORSESHOEING APPARATUS.—John B. Brusoe, Sula, Ill.
123,232.—POCKET-BOOK.—Florian Busch, New York City.
123,233.—PLATEN-GAUGE.—Hulbert Byxbe, Williamsport, Pa.
123,234.—PRUNING-SHEARS.—Thomas Campbell, East Palestine, Ohio.
123,235.—CULTIVATOR.—Adolf F. Carlson, Attica, Ind.
123,236.—SELF-RELEASING HOOK.—James L. Cathcart, Washington, D. C.
123,237.—MECHANICAL MOVEMENT.—Edwin Chapman, assignor to himself, Allen K. Williams, James M. Williams, and Charles H. Chadbourn, Rochester, Minn.
123,238.—KNIFE-CLEANER.—Augustus B. Clarke, Wyandotte, Mich.
123,239.—CARPET-STRETCHER.—William P. D. Claybrook, Palmyra, Mo.
123,240.—SENSITIZED PHOTOGRAPHIC PAPER.—John G. Coffin, assignor to Sensitized Paper Company, Portsmouth, Ohio.

123,241.—CHILDREN'S CARRIAGE.—Isaac Cole, assignor to George M. Ballard, Newark, N. J.

123,242.—CLOTH-CUTTING ATTACHMENT FOR SEWING-MACHINES.—Jacob L. Coles, Newark, N. J.

123,243.—CHISEL FOR POINTING PICKETS.—Anthony Damitio, Detroit, Mich. Ante-dated Jan. 22, 1872.

123,244.—MACHINE FOR DRESSING, DRILLING, AND FINISHING STONE.—William H. Daniels and Joseph H. Willett, Bryan, Ohio.

123,245.—BLACKSMITH'S TOOL-BOX.—Benjamin G. Devoe and Timothy Rogers, Fredericktown, Ohio, and John C. Beals, Searsport, Maine.

123,246.—COUNTERSINK.—Wallace H. Dodge, Mishawaka, Ind.

123,247.—MANUFACTURE OF SILVERED MIRRORS.—Dominique Durand, New York City.

123,248.—GIN-GEARING.—Harris R. Easterling, Bennettsville, S. C.

123,249.—LADIES' ACCOUCHING GARMENT.—Harris R. Easterling, Bennettsville, S. C.

123,250.—BUTTON-HOLE CUTTER.—William W. Egnew, Detroit, Mich.

123,251.—WINDING MACHINE.—Frederick C. Ehrenberg and Theodor Ehrenberg, New York City.

123,252.—AUTOMATIC FIRE-REGULATOR.—G. Morgan Eldridge, Philadelphia, Pa.

123,253.—WEIGHING MACHINE.—Albert H. Emery, New York City.

123,254.—MANUFACTURE OF MOLDED ARTICLES FROM PLASTIC MATERIALS.—Alanson C. Estabrook, assignor to Florence Manufacturing Company, Northampton, Mass.

123,255.—MANUFACTURE OF GAS FOR ILLUMINATING AND HEATING.—George Eveleigh, Asylum Road, Peckham, Great Britain.

123,256.—DIE FOR WELDING AND FORMING HORSESHOE TOE-CALKS.—Jeremiah Flynn, Portland, Conn.

123,257.—SEED-SOWER.—James R. Gilbert, Starkville, Ga.

123,258.—COFFEE-POT.—Cornelius D. Goodrich, assignor to himself and Hammon Teats, Ann Arbor, Mich.

123,259.—LUBRICATOR FOR STEAM-ENGINES.—Moses Hawkins, Birmingham, Conn. Ante-dated Jan. 24, 1872.

123,260.—BALANCED SLIDE-VALVE.—Thomas H. Hollis, assignor of one-half his right to Alvin P. Hovey, Mount Vernon, Ind.

123,261.—MILK-STRAINER.—William H. Johnson, Delhi, N. Y.

123,262.—DITCHING PLOW.—John Kelly and William H. Hennis, Winamac, Ind.

123,263.—FOUNTAIN-PEN.—Levi M. Knisely, New Philadelphia, Ohio.

123,264.—COMBINED INJECTOR, FEED-WATER HEATER, AND CONDENSER.—Ernst Korting, Vienna, Austria.

123,265.—MACHINE FOR CUTTING CONFECTIONERY-PASTE, SOAP, AND OTHER PLASTIC COMPOSITIONS.—Moritz Laemmel, Bay Ridge, N. Y.

123,266.—PRINTING-PRESS.—Moritz Laemmel, Bay Ridge, N. J.

123,267.—LATCH FOR GATES.—George W. Large, Yellow Springs, Ohio.

123,268.—TOY GUN.—Adam I. Lenhart, assignor of one-half his right to Daniel B. Felter, New Brunswick, N. J.

123,269.—HOT-WATER BOILER.—Philip Lesson, Newark, N. J.

123,270.—LIFTING-JACK.—Lewis M. Lusk, Centerton, Ohio.

123,271.—ARTIFICIAL TEETH.—Charles H. Mack, Portland, Oregon.

123,272.—PLOW.—Elbridge G. Matthews, Oakham, assignor to Franklin F. Holbrook and Thomas B. Everett, Boston, Mass.

123,273.—APPARATUS FOR PRESERVING MEATS AND VEGETABLES.—William Maxwell, Henderson, Texas.

123,274.—PROPELLER.—George L. McCay, Linwood Station, Pa.

123,275.—COTTON AND HAY PRESS.—James C. McCurry, Wall Hill, Miss.

123,276.—SOLDERING-TOOL.—Louis McMurray, Baltimore, Md.

123,277.—NEEDLE-THREADER.—Sophia L. Mercer, Washington, D. C.

123,278.—MILK-COOLER.—Norton W. Miller, East Randolph, N. Y.

123,279.—SPRING FOR BED-BOTTOMS.—William H. Miller, Hannibal, Mo.

123,280.—CONCRETE PAVEMENT.—George H. Moore, Norwich, Conn.

123,281.—HARNESS-BUCKLE.—John H. Morris, Normal, Ill.

123,282.—FURNACE FOR HEATING AND PUDDLING IRON, ETC.—John Morrison, East St. Louis, Ill.

123,283.—PITMAN FOR HARVESTERS.—Jacob M. Mourer, Millheim, Pa.

123,284.—SPEED-SIGNAL FOR RAILROAD TRAINS.—William L. Needham, Cleveland, Ohio.

123,285.—PITMAN-CONNECTION.—Adam Neer, Bellefontaine, Ohio.

123,286.—DITCHING MACHINE.—George W. Nevill, Richmond, Va.

123,287.—STEP-LADDER.—Emily M. Norton, Bridgeport, Conn.

123,288.—PAPER-FILE.—Charles M. O'Hara, New York City.

123,289.—CHURN.—Susan M. Palmer, Greene, N. Y.

123,290.—NAIL-PLATE FEEDER.—Harrison B. Perkins and Edwin C. Perkins, Oxford, N. J.

123,291.—HARVESTER.—Thomas Plumleigh, Dundee, Ill.

123,292.—STEAM VACUUM PUMP.—William E. Prall, Washington, D. C.

123,293.—PAINT AND VARNISH BRUSH.—Alexander Randol, assignor to himself, Robert J. Grier, and William Kennedy, Pittsburg, Pa.

123,294.—WHEEL PLOW.—John H. Robbins and Samuel Robbins, Bethel, Oregon.

123,295.—PROVISION-SAFE.—Otis E. Sanford, William H. Dunnington, and Chancellor Weed, La Porte, Ind.

123,296.—WELDING COPPER.—Christian L. Schurr, and William G. Rehbein, Baltimore, Md.

123,297.—IRON VIADUCT.—Edward W. Serrell, New York City.

123,298.—COMBINED DAMPER AND STOVE-PIPE COLLAR.—Absalom S. Shontz, Quincy, Ill.

123,299.—IMITATION BUTTON.—William H. Shurtleff, Providence, R. I.

123,300.—FURNACE.—Jacob W. Smith, Chicago, Ill. Ante-dated Jan. 22, 1872.

123,301.—DRAWER-PULL.—William E. Sparks, assignor to Sargent & Co., New Haven, Conn.

123,302.—CORNER-POST FOR CARRIAGE-SEATS.—Solon S. Stanley, Sandusky, Ohio.

123,303.—EXCAVATING AND DITCHING MACHINE.—Mordica M. Stewart and John D. M. Russell, Mayfield, Ky.

123,304.—BLOWER.—John A. Svedberg, Washington, D. C.

123,305.—ALARM-LOCK.—George Jacob Swingle, Davenport, Iowa. Ante-dated Jan. 29, 1872.

123,306.—CORE FOR DIKES.—William A. Thompson, Brooklyn, N. Y.

123,307.—WOOD-SCREW MACHINE.—Cyrus B. F. Tingley, Pawtucket, R. I.

123,308.—DEVICE FOR CHANGING THE GAUGE OF RAILWAY-CARS.—David Todd, Detroit, Mich.

123,309.—PAPER-RULING MACHINE.—James Tregurtha, Charlestown, Mass., assignor to William O. Hickok, Harrisburg, Pa.

123,310.—PROCESS FOR PREVENTING INCRUSTATION IN STEAM-BOILERS.—Pierre Victor Vigier, Paris, France.

123,311.—VALVE-COCK.—James Walsh, Philadelphia, Pa.

123,312.—AIR-BRAKE FOR RAILROAD-CARS.—Thomas O. Ward, Paw Paw, Mich.

123,313.—WEB SLIPPER.—Lucius K. Washburn, Worcester, Mass.

123,314.—DEVICE FOR LOWERING AND RAISING STEAMBOAT CHIMNEYS.—William Weaver, assignor to himself and Stephen Stucky, New Albany, Ind.

123,315.—ELECTRO-MAGNETIC STOP-MOTION FOR KNITTING MACHINES, LOOMS, ETC.—Horace E. Wells and Daniel H. Moran, Van Wert, Ohio.

123,316.—BOOT.—Presbury West, Worcester, Mass.

123,317.—VALVE-SEAT.—Daniel Wiehl, Cincinnati, Ohio.

123,318.—MILK-VAT.—Owel H. Willard, Randolph, and Andrew Pope, Conewango, N. Y.

123,319.—HAND CORN-SHELLER.—William H. Wilson, Boston, Mass.

123,320.—ROTARY STEAM-ENGINE.—Gustavus R. Winkler, Williamsport, Pa.

123,321.—PRUNING-SHEARS.—Edwin L. Yancey, Batavia, N. Y.

123,322.—HAND-CAR.—L. James Cathell, Salisbury, Md.

RE-ISSUES.

4,723.—SCHOOL-DESK.—Herbert L. Andrews, Chicago, Ill. Patent No. 82,061, dated Sept. 15, 1868.

4,724.—HEEL-CUTTING MACHINE.—Oliver G. Critchett, assignor to David Whittemore, Stoneham, Mass. Patent No. 43,183, dated June 21, 1864.

4,725.—SELF-ACTING JACK FOR SPINNING.—Patrick Keane, assignor to himself and Samuel Bilbrough, Cohoes, N. Y. Patent No. 117,893, dated Aug. 8, 1871.

4,726.—VAGINAL IRRIGATOR.—Morris Mattson, New York City. Patent No. 68,096, dated Aug. 27, 1867.

4,727.—MANUFACTURE OF CAST-STEEL IN CRUCIBLES.—Charles Motier Nes, York, Pa. Patent No. 121,889, dated Dec. 11, 1871.

4,728.—SPRING BED-BOTTOM, SOFA, AND CHAIR-SEAT.—Charles Rich, assignor to Metallic Union Spring Company, Poughkeepsie, N. Y. Patent No. 116,529, dated June 27, 1871.

4,729.—COOLING AND MIXING SOAP.—James D. Sturges, Chicago, Ill. Patent No. 114,063, dated April 25, 1871.

4,730.—APPARATUS FOR COOLING AND MIXING SOAP.—James D. Sturges, Chicago, Ill. Patent No. 114,063, dated April 25, 1871.

DESIGNS.

5,496.—SHAWL-PATTERN.—Henry Boot, assignor to Thomas Dolan, Philadelphia, Pa.

5,497.—LABEL.—Charles H. Collins, Cincinnati, Ohio.

5,498.—CUPBOARD-TURN.—Otto F. Fogelstrand, assignor to Hart Manufacturing Company, Kensington, Conn.

5,499.—COAT AND HAT HOOK.—Otto F. Fogelstrand, assignor to Hart Manufacturing Company, Kensington, Conn.

5,500.—CHAIN-BOLT.—Otto F. Fogelstrand, assignor to Hart Manufacturing Company, Kensington, Conn.

5,501.—FRENCH WINDOW-CATCH.—Otto F. Fogelstrand, assignor to Hart Manufacturing Company, Kensington, Conn.

5,502.—DRAWER-PULL.—Otto F. Fogelstrand, assignor to Hart Manufacturing Company, Kensington, Conn.

5,503.—DOOR-LATCH.—Otto F. Fogelstrand, assignor to Hart Manufacturing Company, Kensington, Conn.

5,504.—CUPBOARD-CATCH.—Otto F. Fogelstrand, assignor to Hart Manufacturing Company, Kensington, Conn.

TRADE-MARKS.

640.—REFINED PETROLEUM.—Frederick M. Backus & Company, Cleveland, Ohio.

641.—EMERY.—Tully & Davenport, New York City.

642.—COMMERCIAL FERTILIZER.—Walton, Whann & Co., Wilmington, Del.

643.—BOOT OR SHOE.—Freeman Winslow and Josiah W. Rogers, Boston, Mass.

APPLICATIONS FOR EXTENSIONS.

OPPONENTS of extensions must file *written* objections in the Patent Office at least 20 days before the day-of-hearing; and on the Patent Office, and state the reasons of their opposition. All testimony—*pro* or *con*—must be taken and transmitted in accordance with the official rules, which will be furnished on application. The under-named patentees have recently petitioned for extensions (for seven years) of patents granted to them in the year 1858:—

JOHN DU BOIS, Greensborough, Ala.—*Cotton-gin.*—Patented April 27, 1858; re-issued June 28, 1870; testimony will close on March 26, next; last day for filing arguments and examiner's report, April 5; day-of-hearing, April 10.

WALTER K. FOSTER, Cambridge, Mass.—*Pencil-sharpener.*—Patented April 27, 1858; testimony will close on March 26, next; last day for filing arguments and examiner's report, April 5; day-of-hearing, April 10.

JONATHAN P. GROSVENOR, Lowell, Mass.—*Cutter-head and Table rest for cutting Irregular Forms.*—Patented May 25, 1858; testimony will close on April 23, next; last day for filing arguments and examiner's report, May 3; day-of-hearing, May 8.

Letter Box

G. G., OF ILL.—The respective weights of hemp, steel wire, and iron wire ropes are as follows, the circumferential increase being 2¾ inches, as specified by you:—Hemp, two pounds per fathom; steel wire, 6½ pounds per fathom; iron wire, the same. A flat iron wire rope 2¼x½ inches will weigh eleven pounds per fathom.

INVENTOR, OF N. J.—To double the flow of an aeriform fluid practically about four times the pressure will have to be applied. A slight examination will doubtless reveal to you the cause of the difficulty in your gas apparatus.

E. L., OF OHIO.—The United States gallon is defined by law as the volume of water which, at maximum density in the air at 62° Fahr., and thirty inches of the barometer, weighs 58,372 2-10 grains, or 231·114 cubic inches.

T. H., OF IND.—The trouble with the rails referred to by you probably arose from the reprehensible practice of bending the spike out of the way in removing a rail, and then bending it back over the flange of the newly laid rail. In such cases the hold on the rail is slight, and the track is not safe. Your men should be looked after more closely.

APPRENTICE, OF OHIO.—Something more than the mere heating surface must be taken into consideration, in providing for the most efficient evaporation in a steam-boiler. C. Wye Williams mentions an experiment, where a given area of heating surface with large tubes produced results quite as efficient as those obtained with double the surface with small ones.

H. C., OF N. Y.—This is the practical rule for determining the solid contents of a wedge:—To the length of the edge add twice the length of the base; then multiply this sum by the height of the wedge and the breadth of the base, and one-sixth of the product will give the cubic contents.

R. S. T., OF CT.—Sheet aluminum has a specific gravity of 2·67, and a weight per cubic foot of 166·6 pounds. We have no data from which to find its tensile strength and crushing weight. You had better determine these by original experiments, and let us know the result. The idea of using aluminum in the construction of flying machines was suggested several years ago.

EXPERIMENTER, OF VT.—Bean oil is said to be largely manufactured in the northern provinces of China, but we do not know that anything of the kind is done either in Europe or in this country. As you say, it may afford a chance to utilize land that "nothing but white beans will grow on," but we think there are other industrial enterprises to which your attention can be more profitably directed.

L. L., OF R. I.—We have not space to treat fully of all the matters mentioned by you concerning iron pillars. On the special point referred to in your communication, it may be stated, in all long pillars of the same dimensions resistance to crushing by flexure is about three times greater when the ends are flat than when they are rounded.

ENGLISH PATENT JOURNAL.

LIST OF APPLICATIONS FOR PATENTS ON WHICH Provisional Protections HAVE BEEN OBTAINED IN ENGLAND BY OR FOR AMERICAN INVENTORS.

[*This list is condensed weekly from the "Journal of the British Commissioners of Patents," expressly for the* "AMERICAN ARTISAN."]

2,830.—PENCIL AND ERASER.—J. Reckendorfer, New York City.—Oct. 23, 1871.

3,430.—HOISTING APPARATUS AND ENGINES FOR OPERATING THE SAME.—C. R. and N. P. Otis, Yonkers, N. Y.—Dec. 18, 1871.

3,510.—MACHINE FOR EXCAVATING, GRADING, DITCHING, AND CONVEYING PURPOSES.—S. Sweet, Dansville, N. Y.—Dec. 29, 1871.

3,527.—LUBRICATING THE AXLES OF RAILWAY CARRIAGES.—W. Painter, Owing's Mills, Md.—Dec. 30, 1871.

5.—CARRIAGE-WHEELS.—H. Silvester, St. Louis, Mo.—Jan. 1, 1872.

10.—LOOMS FOR WEAVING NARROW FABRICS.—W. Day, Newark, N. J.—Jan. 1, 1872.

33.—MAGNETIC BINNACLE.—John Low, Boston, Mass.—Jan. 4, 1872.

41.—STEAM WATER-HEATER.—James Argall, Mineral Point, Wis.—Jan. 5, 1872.

46.—LUBRICATOR FOR RAILWAY AXLES.—C. Mettam and J. S. Sanson, New York City.—Jan. 5, 1872.

50.—REGENERATION OF HEAT FOR FURNACES, ETC.—William and G. H. Sellers, Philadelphia, Pa.—Jan. 6, 1872.

59.—MELTING FURNACE.—G. H. Sellers, Philadelphia, Pa.—Jan. 10, 1872.

61.—SELF-RELEASING HOOK.—J. L. Cathcart, M. Ezekiel, E. F. M. Faehtz, Washington, D. C.—Jan. 8, 1872.

80.—IMPROVEMENT IN DISCHARGING OR TAPPING MOLTEN METAL FROM FURNACES OR CRUCIBLES, AND IN CASTING THE SAME INTO MOLDS.—W. Sellers, Philadelphia, Pa.—Jan. 10, 1872.

98.—COMBINED TOOL.—Joseph Dixon, New York City.—Jan. 12, 1872.

121.—PIPES AND PIPE-JOINTS FOR GAS, WATER, ETC.—W. Radde, New York City.—Jan. 15, 1872.

GIBSON'S IMPROVED "SAFETY" HOLLOW-WARE.

ALTHOUGH numerous improvements are being patented every year on heating and cooking stoves, comparatively few patents are granted, and but few real improvements are made, in hollow-ware for culinary purposes.

We illustrate in this article *various improvements* in hollow-ware, which we think will attract the attention of manufacturers and interest the public, and which seem to merit the name of "Safety Hollow-Ware" adopted by the patentee.

Fig. 1.

Fig. 1 represents an improved cast-iron tea-kettle, which *will not roll* or sway sidewise in the act of pouring, being provided (as shown in the cut) with a flat bevel bearing at the front lower edge of the pit, and with two light perpendicular projecting ribs at the front of the body of the kettle, below the spout.

All danger from scalding is entirely prevented by this method of construction, as the kettle is perfectly steady during the operation of pouring therefrom, no matter whether it is full of water or quite empty.

Tea-kettles made of *copper* or *tin* can also have the same improvements readily applied to them, by having the usual copper bottoms "struck up" with the bevel bearing at the front edge, and, by means of a small ornamental malleable iron plate,

Fig. 2.

having two horns or slight projections (corresponding to the ribs on the cast-iron tea-kettle). This plate is riveted or otherwise fastened on the front and just below the spout of the kettle.

Fig. 2 illustrates the same principle as applied to a stove-pot or kettle. The two vertical ribs or rockers on the side near the base, being nearly in line with the bail, afford a steady bearing for the vessel while pouring out the hot water or other contents, thus making it *safe and convenient* for a person to do *with one hand* that which was heretofore a difficult and dangerous operation even with both hands.

Another improvement is shown in Fig. 2, consisting of a "locking cover," provided with openings on one side, at the edge, so that, when the pot or kettle is canted, the water may be poured off, while meat, vegetables, and the like *are retained within*.

This cover is held in place by three small bent "nibs," riveted to the edge of the vessel, and, by turning the lid a short distance sidewise, a notch or recess in the edge of the same is brought under one nib, thus allowing the lid to be readily removed.

As this cover is made to turn or revolve readily, the openings in the same may be available in any desired position, either as shown in the cut, or, by turning the cover round, the openings may be brought over the ribs or rockers on the side of the vessel, and be used in combination therewith; or, if desired, the openings in the cover may be dispensed with, and the nibs may be attached to the vessel, so as to permit the cover to raise a little at the lower edge, in the act of pouring, allowing room for the free escape of the water, *under the edge*, while vegetables, etc., would be retained by the locking cover.

To further facilitate the handling of kettles, stove-pots, and the like (which are generally not

Fig. 3.

only *heavy*, but also filled with *scalding water*), a pierced lug or equivalent projection is cast on or riveted to the side, preferably near the base, as shown in Fig. 2, so that, when canting the vessel, the weight of the same *is divided between both hands*, one hand having hold of the bail, while the other hand *lifts and tilts*, by means of the ear or projection on the side of the vessel, as shown in Fig. 3.

By this arrangement, *a child* may decant or pour out the boiling water from a pot or kettle *with ease and perfect safety*, an operation heretofore difficult, and attended with great danger of scalding, even to a grown person, and much more so to those of slender strength.

These various improvements, as described, are covered by several different patents, and may be used separately in manufacturing, or may all be combined in the same vessel if desired. For further information, address the owner, John Gibson, Jr., Albany, N. Y.

Spiral Leyden Jar.

ACCORDING to a writer in the *Philosophical Magazine*, a spiral Leyden jar may be constructed as follows:—"A strip of tinfoil, four feet long, and eight inches wide, is placed in the center of a strip of vulcanized caoutchouc four feet long, and one foot wide, in such a way that at one end (say the right) there is a margin of four inches of caoutchouc, and at the other (the left) four inches of tinfoil. A second piece of caoutchouc, of the same dimensions as the first, is placed over the tinfoil, the ends coinciding with the first piece of caoutchouc. A second piece of tinfoil, of the same width as the first, but four inches shorter, is then laid on the second caoutchouc, with its right-hand end over the end of the first foil, its left end of course falling four inches short. A brass wire with a knob is laid across the end of the upper foil. The whole is then rolled up from the right end, and bound. What was the lower of the two foils projects between the two layers of caoutchouc, and may be prolonged around the circumference of the roll. It forms the outer coating, or earth surface. What was the upper coating of foil now corresponds to the inner coating of the ordinary jar, and is entirely covered, excepting when it is prolonged by the wire and knob at the center of the roll. If the sheet caoutchouc be one-eighth of an inch in thickness, a jar of very great electrical capacity is obtained."

Consumption of Smoke.

AT the November meeting of the Scientific and Mechanical Society of Manchester, England, the discussion turned on smoke-consuming furnaces. After a thoroughly scientific *exposé* of the generally accepted theory of smoke consumption, and of the hundred and one inventions, self-acting and otherwise, that have been applied for this purpose, the practical experience of the members was brought to bear upon it. Self-acting apparatus was voted to be of no practical use whatever. The system of admitting air behind the bridge found a few supporters, but after being brought to the test of experience, even with all its appliances of hollow fire-bars and perforated bridge, its advantages were found to be very doubtful. The opinion of the majority of the members was, that a short dead plate, with perforated fire-door, and an efficient stoker, is the best smoke-consuming apparatus extant, and coupled with plenty of boiler power, to avoid forcing the fires.

Improvements in Propelling and Steering Vessels.

THERE are no problems of marine engineering more complex or difficult of solution than those involved in the improvement of vessels as concerns propulsion and steering. These, however, are claimed to be now obviated by recent inventions which it is now sought to introduce to the shipping interests of this country by the agents, Messrs. Byron, McNeil & Co., Nos. 40 and 42 Broadway. The propelling machinery comprises a peculiar construction of the paddle-wheels with oblique vanes, so applied as to obviate the back-lift incident to those of ordinary construction. This improved rudder is stated to have been used for several voyages on the steamer *Trinicria*, of the Anchor Line, with very satisfactory results. It is made to imitate in action the tail of a fish. We hope to be able to present illustrations of these new devices, which are believed to promise great utility in the department to which they belong.

AMERICAN ARTISAN

BROWN, COOMBS & CO., Publishers.
ISSUED WEEKLY AT
No 189 Broadway, New York.
H. T. BROWN. J. W. COOMBS.

AGENTS.
AMERICAN NEWS COMPANY................New York City.
NEW YORK NEWS COMPANY................ do
NEW ENGLAND NEWS COMPANY.... ....Boston.
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WEDNESDAY, FEBRUARY 7, 1872.

ASBESTOS FOR STEAM PACKING.

WE have more than once called attention to the possible utilization, in various ways, of asbestos, which exists in very large quantities in this country as well as in many parts of the continent of Europe, and in the Islands of Great Britain, Corsica, and Ireland. Any successful application of this material, therefore, to a standard industry is likely to be of use all over the world, and the use of asbestos for piston packing and similar purposes appears, judging from data at present available, to belong to this category. On page 9, current volume of the AMERICAN ARTISAN, we described a method of preparing and using asbestos or amianthus for the purpose indicated, but it is manifest that many different plans of utilizing the substance for steam packing may be readily devised.

It seems that the adoption of asbestos in such connection is purely of American origin, and we notice that in our English exchanges it is receiving much quicker and greater approval than is commonly accorded by our British cousins to ideas derived from this side of the ocean. The *Engineer* expresses the opinion "that this mineral will supply a way out of one of the most troublesome obstacles to the use of very high pressure steam," and gives the results of trials made with asbestos packing that are possessed of more than ordinary interest. The asbestos packing used from the 27th of July to the 18th of November, 1871, on a locomotive of the Caledonian Railway, which during the intervening period ran upwards of fourteen thousand miles, gave the utmost satisfaction, while data derived from American practice shows that the packing has been found as good as new after a three months' trial of a locomotive carrying one hundred and thirty pounds of steam and making seven days in the week a daily run of one hundred miles. While the material resists friction to at least as great a degree as any other, it is superior to all others in its non-liability to injury from a temperature however high, or from moisture, and there seems no good reason why asbestos should not, in this manner, take its place among the most useful of the minor adjuncts of steam engineering practice.

CORK vs. CAOUTCHOUC.

A WRITER in the *Shoe and Leather Reporter*, who claims to speak "not from theory but from fifteen years' practical experience on the bench," urges the desirability of substituting the use of cork soles inside of boots and shoes in place of india-rubber external coverings. The almost absolute waterproof character of caoutchouc, while it insures perfect avoidance of wetting the feet from without, is equally certain to cause dampness from insensible perspiration unable to escape, and in this is indisputably the cause of much disease. On the other hand, cork is an excellent non-conductor of heat, and is, in a very great degree, impervious to the passage of liquids, although pervious to air and vapors. The suggestion referred to is worthy of note, and would doubtless, if practically carried out, provide a decided improvement over ordinary foot-gear. But in the way of this will be found the difficulty of providing a water-tight joint between the insole and the upper, to say nothing of the perviousness of the latter, due to the careless manner in which most of the leather in market is manufactured. The same writer advocates, for stogas and heavy shoes, insoles of light wood, which from its non-conducting properties would materially add to the warmth and dryness of the feet, provided the surface were properly waterproofed with varnish. The ideas suggested appear to be good, although perhaps possessed of little novelty. However, two things may be taken for granted—one, that there is much need of improvement in boots and shoes; and that such improvements, if *bona fide*, may be made very profitable.

PATENT SPECIFICATIONS AND DRAWINGS.—NEW YORK CITY.

Now that the specifications and drawings of patents are published immediately after their issue, it is desirable that they should be made readily accessible to the public whenever possible. In furtherance of this object, the Commissioner of Patents has designated the Mercantile Library, in New York City, as the place of deposit for complete copies of the patents, as published in a volume each week. These volumes may be consulted, free of charge, between the hours of eight in the morning and nine in the evening. The comparatively brief time during the day in which the Astor Library is open, probably, and very properly, led to the selection of the Mercantile for the purpose mentioned.

THE NEW ZEALAND IRON SAND.

FOR a number of years past the titanic iron sand of New Zealand has been the subject of occasional mention, as the prospective foundation of a large metallurgic industry in that island. But the development of such industry appears to be slow, for, although it is a dozen years since attention was first vigorously called to the subject by the English press, it is still the subject simply of experiment and not, it appears, of demonstrated practice. Recent trials, however, undertaken under Governmental sanction, seem to demonstrate the value of the ore for the manufacture of high-grade steel, for which its moderate percentage of titanium would seem especially to adapt the material. According to a correspondent of the London *Times*, the process of working is a very simple one. The iron sand, taken directly from the beach, is mixed with an equal quantity of clay and common sand, the latter composed of silica and minute fragments, in considerable quantity, of shells or calcareous matter. These carefully mingled were worked up in a moist condition and molded into bricks, which were hardened by drying. After this they were broken into fragments and smelted in an ordinary cupola furnace. It is claimed that the product was capable of being, without further melting or treatment, made into the finest penknives and other cutlery. The experiments seem to have been carried on under some disadvantages, the expenditure being limited to about five hundred dollars, and, as a consequence, the appliances used being of a temporary and rude description. Notwithstanding this, about five hundred pounds of excellent steel are stated to have been made at the first trial, and if the reports are correct the experiment may yet lead to the utilization of the vast deposits of this sand of which so much has been said, and with which so little has been done. Any step forward in methods of working up this neglected ore, made abroad, should be deemed worthy of being followed up by those interested in American iron industries, as there exists, we are informed, large quantities of similar iron sand in the Northern portions of the States and in Canada, the practical value of which is as indefinite and undecided as is the case with the deposits referred to, on the other side of the world.

MANY-BARRELED BATTERY GUNS.

LONG before the principle of the revolver became the acknowledged foundation of successful mitrailleuse construction, battery guns comprising sets of barrels arranged in horizontal planes were projected, and these neither few in number nor lacking in apparent utility. Of late years this system has received comparatively little attention, although in one or two instances it has been plausibly suggested to combine the barrels, radiating from a central point at their rear, with a feeding cylinder, in such manner that the rapidity of fire incident to the use of the latter might be availed of in connection with a scattering discharge of bullets over a wide area. The system of the Gatling gun, that of a revolver in which the barrels are brought successively in line, to receive the cartridge and discharge the same, has proved so satisfactory, that for a long time to come inventors may be expected to work in the same groove, but as few or none of the apparatus devised on the plan just previously referred to were ever fully tested, it still remains a question whether the same may not yet be capable of affording a much greater degree of utility than at present it gets credit for. While thus briefly calling attention to a subject likely to loom into prominence again whenever a war shall disturb any of the nations of the earth, we may mention the most recent of these implements brought out by warlike ingenuity in these piping days of peace. It is a magazine gun, intended to discharge a number of barrels either simultaneously or in succession, and this with great rapidity.

It is described as constructed "with a stationary framework, consisting of a breech-plate extending downwards to the magazines, and slotted to permit the rotation of a many-chambered breech-piece which receives the cartridges and carries them up into position for firing; an extension behind the upper part of the breech-plate to contain and guide the firing mechanism; a cradle which receives the magazines, and guides the rammers or feeders by which cartridges are forwarded to the chambers; and a brace which connects the cradle and breech extension, and affords a bearing for a compound shaft through which the breech-piece is revolved, and the simultaneous firing mechanism worked. The barrels are connected to the slotted plate and enclosed within a casing."

STEVENS INSTITUTE OF TECHNOLOGY.

WE are requested to state that the scientific lectures on technical subjects which, as we have already stated, are to be delivered at the above institution during the month of February, will commence at 8 o'clock P.M. Also, that the Stevens Institute has a full set of U. S. Patent Office Re-

ports to date, and that the issuing reports are regularly received. They may at any time be consulted by those desiring to do so, and without charge, by making application at the Institute.

ANNUAL REPORT OF THE COMMISSIONER OF PATENTS FOR THE YEAR 1871.

[Continued from page 66]

The Senate and House of Representatives of the United States of America in Congress assembled:—

Under the provisions of Section 14 of the Patent Act, I have sought to dispose of the models of rejected cases, by permitting regularly-incorporated institutions of learning to select from among them such as they could make useful in teaching the practical sciences. The models thus selected have been carefully invoiced and receipted for by the institutions taking them, to be held subject to the order of the Commissioner of Patents. In this manner about twelve thousand models of rejected cases have been disposed of, and a large number of colleges and polytechnic schools have been supplied with valuable means of instruction. Any one of these models can be recalled, should it at any time be needed by the Office or by the courts in the trial of patent causes.

The Act approved July 8, 1870, known as the Patent Act, has been carefully tested by fair trial, and in most particulars has been found sufficient and satisfactory. In some features, however, I would respectfully suggest that it should be amended.

Section 23 provides that every patent shall date as of a day not later than six months from the time the applicant or his agent was notified of its allowance. The same section further provides that the applicant may have, after said notice is sent him, six months in which to pay his final fee. The Office has not been in the habit of incurring the expense of having the drawings and specifications printed and prepared for issue until the final fees are paid, because frequently the application is abandoned after notice of allowance. It takes about two weeks to reproduce the drawings and specifications and prepare a case for issue. But applicants very often delay paying their final fees until the very last day of the six months allowed by statute for issuing the patent. The section should be so amended as to require the final fees to be paid in at the Patent Office—or, if the money be paid elsewhere, as provided in Section 69, to require the proper evidence of such payment to be presented to the Office—at least two weeks prior to the latest date allowed for the patent to issue.

Section 24, considered in connection with Section 30, gives to citizens of all governments the same rights and privileges before the Patent Office as are granted to citizens of the United States. The spirit of this section is praiseworthy, and to the citizens of countries whose governments reciprocate with similar favors it is unquestionably just. In other cases, however, the wisdom of this provision is by no means clear. Citizens of the Dominion of Canada, under our general law, can obtain patents here on precisely the same terms as citizens of the United States, while the latter must have resided in Canada one year before they can apply for patents at the Canadian office.

The effect of this law practically is to exclude all citizens of the United States from obtaining patents in Canada, and often the result is disastrous to our inventors. The inventor, for instance, of a process or a machine for making a given article of manufacture may suffer by the practice of the invention across the boundary line between the two countries by parties who furnish the manufactured article in our market at such rates as to be ruinous to the inventor. There can be no protection against this practice, except in cases in which a patent can be obtained on the article of manufacture itself as well as upon the process or upon the machine by which it is made. But where the article itself is old, and therefore not patentable, the inventor of the new process or machine for making it is, by the means indicated, left practically without protection.

It has been suggested in various quarters that, with a view to furnishing the Canadian Government a motive for modifying their practically prohibitory law, our own law should be so amended as to limit the rights granted by the Section above referred to the citizens of such foreign countries as accord to the citizens of the United States the same protection as is granted to their own citizens. I think, however, that the wiser course may be to open correspondence with the Canadian authorities through the proper diplomatic channels, with a view to representing the nature of the injustice to which our inventors are now subjected; and it is hoped that when the matter is thus brought home to the attention of the Canadian people, the proper remedy will at once be applied. I withhold any special recommendation in the premises to await the result of such correspondence.

Section 25 provides that, where a patent is first obtained in a foreign country and afterward here, the patent obtained here shall expire at the same time as the foreign patent. This law is just and equitable in cases where the applicant is himself a citizen of a foreign country. In such cases his monopoly here should cease when it ceases at home. But in cases where the patentees are citizens of the United States, I see no reason for the rule. In most of the countries of Europe a patentee need not necessarily be an inventor. They will grant patents as well to the first man who imports an improvement as to the one who invents it. If the importer is the first to apply, he alone becomes the patentee. Hence it is frequently the case that persons other than the inventors will seize upon inventions the day they are patented here, and rush to Europe in advance of the inventors, and secure to themselves the foreign patents.

This fact often compels our inventors to secure their patents abroad first, if they would secure them at all. But under certain contingencies the foreign patents may expire in two, three, or seven years. Under our law at present, their patents obtained here must expire at the same time.

Section 36, providing for the recording of assignments of patents or territorial interests therein, I think, should be so amended as to provide in some manner for the recording of licenses to manufacture or use under the patent. A patentee may cover the country all over with licenses to manufacture and sell under his patent without having the records of the Office show that any portion of his patent, or any rights under it, have been conveyed. A person in purchasing an interest in a patent has no means but the veracity of the patentee for learning to what extent the patent is involved by licenses. For the protection of persons buying interests in patents, all conveyances of any interests or rights of any kind should be made a matter of record, so that the Patent Office may be able to furnish reliable abstracts of title.

Section 48 provides that parties, except parties to interferences, if dissatisfied with the decision of the Commissioner, may appeal to the Supreme Court of the District of Columbia, sitting in banc. I see no good reason for making an exception of interference cases. If other cases are appealable, there is no reason why interference cases should not be. But I would respectfully suggest whether this whole mattter of appeals from the Commissioner to the courts is not an anomaly in our Government. It is true that intricate questions of law are arising and being discussed daily in the Patent Office, and there is a show of propriety in permitting appeals to the courts on these questions of law; but I confess I can see no good reasons for permitting such appeals on questions of fact. When the facts have been examined by a principal examiner, by the Board of Examiners-in-Chief, and by the Commissioner in person, making three separate examinations by three separate tribunals, and all of these examiners supposed to be experts, and all agree as to what are the facts, an appeal to a court composed of able judges, but men not pretending to any expert knowledge of the subject-matter presented to them, it seems to me is not only without reason, but against reason. I would recommend that Section 48 be repealed, and that in its stead a section be introduced authorizing appeals to the Supreme Court of the District of Columbia sitting in banc from the decisions of the Commissioner on questions of law, and that such appeals be in the nature of *writs of error.* If such amendment should be made, Sections 49, 50, 51, and 52 should also be amended to correspond.

Section 53 provides that in applications for re-issues the model and the drawing may be amended each by the other, but that neither shall be amended by the specification. This section works great hardship to inventors in many cases. I think it should be so amended as to authorize the Commissioner in person to permit, in applications for re-issue, either the specifications, drawings, or models to be amended, so as to show what is already clearly shown in either one of them. The privileges granted by this section are, perhaps, more often misused than those of any other section in the patent law. The object of the section is to provide for the correction of errors that have arisen by inadvertence, accident, or mistake, and for such purpose it is very just and proper. Almost all applications under this section are for the purpose of obtaining broader claims than were originally asked for or granted. It not unfrequently happens, however, that a patentee, finding that some other person has made a valuable improvement upon his invention, rushes back to the Office to secure a re-issue of his patent in such form as to cover the later improvements. The Office, not knowing the facts in the case, and finding it possible so to construe the original application as to cover the improvement, the desired claim is granted, thereby giving the patentee a monopoly of what is really the invention of another. To guard against this species of fraud, I would suggest that Section 53 be so amended as to require that a notice of all such applications for re-issues as seek to enlarge the original claims be published in the *Official Gazette* for at least four weeks previous to the day set for examining the same, and that opposition be allowed as in extension cases.

It often happens that, by a misapprehension of the law or the facts, parties in good faith make joint application for a patent when only one was the real inventor, or the two were inventors of different parts so distinct as to be divisible; but the Office, not learning these facts in an *ex parte* examination, grants a patent to such parties joint-

ly. Under the rulings of the courts, such patents are worthless, giving no protection, and the inventor is without remedy. I would suggest that Section 53 be further amended so as to make a misjoinder of parties in an application, where no fraud was intended, a good ground for re-issue. Under the law as it now stands, the courts hold that a patentee surrendering his patent for re-issue, by such act of surrender relinquishes all his rights of action that may have accrued against infringers of the surrendered patent. This often works hardship and wrong against inventors. I think it would be just to the patentee and equity to all concerned, if the law could be so amended as to save rights of action in such cases where the claim infringed is substantially the same in the surrendered patent as in the re-issue.

Section 64 requires that a notice of all applications for extensions shall be published for at least sixty days in one paper in the city of Washington, and in other papers in the section of the country is most interested adversely to the extension. There is no way in which the Office can determine what section of the country is most interested adversely to the extension of the patent. The practice has always been to advertise in the section where the patentee resides; but in a majority of cases, probably, that is not the location where those opposed to the extension would be most likely to see the notice. It very often happens that patents are extended before parties desiring to oppose know of the pendency of an application. There should be a single paper designated by law, in which all notices of applications for extensions of patents are published. That would enable any person to learn of the pendency of such applications. I would recommend that Section 64 be so amended as to require, in lieu of the publication now demanded, that all notices of applications for extensions be published in the *Official Gazette* of the Patent Office for at least six weeks prior to the day set for hearing the same. The *Official Gazette* is already being taken by nearly every patent attorney and solicitor of patents in the country, and by very many inventors and manufacturers. Such publication would be certain in almost every case to reach all persons interested adversely to a proposed extension, and the saving thus effected in the expense of advertising would do something toward paying the cost of the *Official Gazette*. As the Patent Office is expected to be self-sustaining, it should be relieved of needless expense.

One-half of the fee in extension cases is by law required to be paid upon filing the application and the balance upon granting the certificate of extension. The decision refusing or granting the extension is required to be made prior to the expiration of the original term of the patent. As the decision to extend carries the monopoly, the patentee frequently lets the certificate lie in the Office for months and years, and sometimes for the whole term of the extension, without paying his final fee. If he needs the certificate of extension at any time to prosecute infringers he then takes it, and as it bears even date with the expiration of the original term, it covers the whole term of the extension. If he should not need the certificate for such purpose he may permit the extended term to expire and never pay his final fee. This fraud upon the Office should be provided against. I would suggest that Section 63 be so amended as to authorize the Commissioner to withhold and cancel certificates of extension in cases where the final fees are not paid within thirty days of date of notice that extension has been granted.

Section 71 provides :—

That any person who, by his own industry, genius, efforts, and expense has invented or produced any new and original design for a manufacture, bust, statue, alto-relievo, or bas-relief; any new and original design for the printing of woolen, silk, cotton, or other fabrics; any new and original impression, ornament, pattern, print, or picture, to be printed, painted, cast, or otherwise placed on or worked into any article of manufacture, or any new, useful, and original shape or configuration of any article of manufacture, the same not having been known or used by others before his invention or production thereof, or patented or described in any printed publication, may, upon payment of the duty required by law, and other due proceedings had the same as in cases of inventions or discoveries, obtain a patent therefor.

I am clearly of the opinion that the present mode of patenting designs is radically wrong, injurious to real inventors and the public, and not calculated "to promote the useful arts." Under Section 71 the Office issues patents for mere changes in form or color, without regard to construction, function, or utility. This class of patents has been to some extent subversive of the fundamental object of the patent law. Very many design patents which cannot, under the law, be denied, are a fraud upon the public. A man applies for a patent on a cultivator, or hammer, or any other useful tool or device, and, finding himself fully anticipated in every principle and useful feature of his invention, abandons his application, and at once applies for a design patent for the same thing. This application he bases upon some peculiarity of form or color, having nothing whatever to do with the merits or demerits of the article itself, and, not being anticipated in these respects, a patent is granted for the new design. The patent gives him no protection whatever, except as to the form or color upon which it is based. He, however, obtains from the Office the right to stamp the word "patented" upon the article he is manufacturing, and thereby deceives the public, wrongs inventors, and brings patented articles into disrepute. Patents have greatly increased in popularity within the last few years, and manufacturers regard it as an advantage to have the right to affix the word "patented" upon the products of their shops or factories. This fact has led to very great abuse of the privileges granted by the section authorizing patents for designs. The protection of the public and of true inventors alike demands such modifications of the law as to distinguish widely between designs and inventions. Designs are in the field of taste, beauty, ornamentation; while inventions have to do with utility, resulting from new constructions and combinations. Designs look to esthetic effects; inventions, to economical productions. Each has its proper sphere, but so distinct that they ought not to overlap each other in the Office practice. Each should be protected, but by instruments and marks easily distinguishable by the public. I therefore recommend such modification of the Patent Act as will place designs upon substantially the same basis as trade marks. If a design is new, let the applicant have a certificate of registry, with authority to mark his productions "registered" instead of "patented." The fact is that a very large proportion of designs are used merely and solely as trade-marks. A man adopts a peculiar form or color for his articles of manufacture, that they may be known as his in the market; that he and his place of business may be pointed out by the peculiarity of the color or conformation. Such a modification of the law, I believe, would furnish ample protection to designs, and, in fact, would enable the Office to issue certificates of registration in many cases where, from public policy, it now refuses design patents. I earnestly recommend early legislation on this subject.

By Section 77 the right to apply for registration of trade-marks is limited to citizens of the United States and to residents of such foreign countries as, "by treaty or convention," afford similar privileges to citizens of the United States. This restriction excludes residents of Canada and England, and perhaps other countries which, by statute, in the absence of "treaty or convention," afford the right of registry to citizens of the United States. I therefore recommend that this section be amended by striking out the limiting phrase, "by treaty or convention."

The discussion that has been going on in England during the past year on the comparative merits of the English and American patent systems has excited considerable interest in this country. The English system finds a few honorable and able advocates here, but a very large majority of inventors and others intelligent upon the subject seem to be ardently attached to our own system. The American system secures a preliminary examination by experts on the question of novelty, and the issue of the patent is made dependent upon the result of such examination. Consequently, the patent when issued carries with it a presumptive right to its claims, and immediately has a value in the market, the amount of value depending principally upon the importance of the invention covered by the claims. The strength of the presumption in favor of the patent will, of course, depend upon the reputation the Patent Office may have for making honest and thorough preliminary examinations.

In England, patents are granted to every applicant without any inquiry into the questions of novelty or usefulness; and the patent is utterly without value until the patentee has, by litigation in the courts, established the fact that the invention to which it relates is new and useful. Unless an inventor is able to pay court costs and liberal fees to attorneys and experts, he is much richer without a patent than with one. A poor inventor, under the English system, is entirely at the mercy of capitalists, and must in general assign a controlling interest in his patent to secure the means to establish even a presumption in its favor.

The objections urged against the American system, so far as there is any validity at all in them, are chargeable, I believe, against the mode in which the system is organized and operated rather than against the system itself. The more thorough and searching the preliminary examination, the more valuable will be the patent when issued; the better the organization of the Office to secure such examinations, the greater will be judicial and public confidence in the validity of patents. To secure the best possible organization for this purpose is a matter of the highest consideration. That the present organization of the examining corps has some radical defects cannot be denied. That these defects can, in a great measure, be remedied, I feel very confident. On this subject, I propose soon to address a communication to the Honorable Secretary of the Interior, and if it meets his approbation it will probably be forwarded to Congress with such suggestions as he may be pleased to make.

Protection to inventors is encouragement to every branch of industry. Such protection has already placed our country far in advance of all others in the development and adaptation of labor-saving machinery. In addition to this class of wealth which inventors have contributed to the country, they have paid, directly, the entire cost of our patent system and three fourths of a million of dollars in excess. They do not now ask

that the fees shall be reduced nor that the excess shall be returned; but they do demand that the organization of the Office shall be such as to do better work, and that the force be made sufficient to do it more promptly. On these matters I would recommend cautious but liberal legislation. Respectfully submitted. M. D. LEGGETT,

Commissioner of Patents.

NEW AMERICAN PATENTS.

WE give, as follows, notices of some of the most interesting inventions for which Letters-Patents of the United States have recently been issued :—

APPARATUS FOR EXHAUSTING GAS FROM RETORTS.—J. Kidd, New York City.—*Jan.* 23.—The more noticeable feature of this improvement is found in the combination with a vaporizing apparatus, in which vapor is generated under pressure, of two wet gas-meter drums, both made fast to one shaft; one drum being driven by the pressure of the escaping vapor as it passes to retorts to be decomposed, and the other connected to the outlets of said retorts for exhausting or withdrawing the gas therefrom. There is also claimed an adjustable cock or outlet, placed in any part of the exit-pipe between the decomposing retort and the exhausting drum, for allowing air to be drawn into the drum with the gas.

MANUFACTURE OF GRUBBING HOES AND PICKS. —J. Lee, Cleveland, Ohio.—*Jan.* 23.—This invention relates to forming the eyes of grubbing hoes, mattocks, and other similar implements, having an eye for holding the handle, so that the said eye shall have its ends above the bar or blank closed, or nearly so, and consists in the employment of a flat, broad-headed eye-pin on which to extend and spread the metal of the ears sidewise after the eye-hole is punched.

TOOL FOR TWISTING WIRE FOR WIRE GUARDS. —J. McMurray, Brooklyn, N. Y.—*Jan.* 23; antedated *Dec.* 30.—The more important element in this invention comprises a method of forming wire-guards of unannealed wire, by the twisting together at intervals of the strands in pairs, to form the figures or meshes by means of clamps having faces formed with V-grooves in them.

VULCANIZED RUBBER PENCIL-MARK ERASER.— T. H Müller, Yonkers, N. Y.—*Jan.* 23.—In the manufacture of india-rubber erasers composed of an india-rubber body combined with a wrapper or sheath of wood, paper, leather, or other material, this inventor claims the mode of joining the same together by applying the sheath or wrapper while the rubber is in the green or plastic state, and then uniting the two by and during the act of vulcanizing.

METHOD OF PROTECTING SAFES, ETC., FROM BURGLARS.—C. C. Rowell and W. Duncan, Lebanon, N. H.—*Jan.* 23.—Among other essential features of this apparatus may be more particularly noted the combination with an electric circuit, and clockwork operated by the same, of peculiarly constructed alarm-gongs, also an alarm-box the door or other port of which is made up of a series of perforated plates, the perforations of which break joints to prevent ingress to the clockwork, while free air communication is retained with the interior of the box to emit the sound of the alarm.

STOVE-PIPE SUPPORTER.—R. Street, Albany, N. Y.—*Jan.* 23; ante-dated *Jan.* 20.—This holder for fastening stove and other pipes in position is constructed with projecting ends, pierced for the passage through of a bent rod, the whole firmly held together by a cap or slide that embraces both projecting ends and bent rod.

LANTERN.—C. S. S. Baron, Bellaire, Ohio.—*Jan.* 23.—In this device, a lantern having outer tubular guards, for connecting the dome with the foot to secure the globe, are used; such tubular guards made in distinct and separable sections, so as to be united with each other and to admit of their separation. In the lantern as made with such sections, there is also combined a suitable automatic locking spring. This spring has its free ends provided with their upper edges beveled downwardly and their lower edges straight, to act in conjunction with the ends of the tubular guards, to effect their automatic locking, and to prevent unlocking of said connection; certain other combinations of parts are also included in the invention.

ELECTRO-MAGNETIC ENGINE.—C. V. Gaume, Williamsburg, N. Y.—*Jan.* 23.—The gist of this invention is found in an armature formed of a central bar attached to a wheel at its center, and having cross-heads between center and ends that are provided with short bars upon their ends parallel to the central bar, and whose ends project equally upon the outer and inner sides of the cross-heads.

BOOT AND SHOE.—J. M. Hunter, New York City. —*Jan.* 23.—This improved boot or shoe has a permeable insole, composed of pasteboard, with open or unsaturated woolen and muslin on one or both sides thereof, the parts being compressed together and joined by a waterproof cement at the edges. Certain novel arrangements of parts relate to the ventilation of the foot-gear and the swiveling of the heels thereof. There is also claimed a novel arrangement of bent wire springs having a fixed attachment to the heel and also to the metallic sole, bending upwards, whereby the shank' is retained to the cavity of the foot.

PRINTING TELEGRAPH.—T. A. Edison, Newark, N. J.—*Jan.* 23.—In this apparatus two type-wheels are fitted to slide endwise of their shaft, in combination with mechanism to give such end movement, and a shield to prevent an impression from more than one of the type-wheels. The invention also includes a lever connected with the type-wheel shaft, and type-wheels in combination with fingers that are moved by the impression lever. Also, a stationary notched ring in combination with the type wheels fitted to slide endwise on the shaft.

HORSESHOE.—W. L. Edwards, Ellison, Ill.— *Jan.* 23.—This improved horseshoe is made in two parts, hinged or jointed together at the toe and provided with a spring, bent in the center, and the ends attached to the sides of the shoe at the heel. There is also provided, in combination with the horseshoe as thus constructed, leveled heel-calks, slotted plate, set-screws, and apron, arranged in suitable relation with each other.

HAND-MIRROR.—A. C. Esterbrook, Northampton, Mass.—*Jan.* 23.—This invention embraces a novel method of fastening the glass into a hand or toilet mirror by means of a beveled edge in the cavity, and a corresponding bevel on the strip of wood or other material. Also, the combination with such bevels of a shoulder and table suitably provided in relation thereto.

PREPARING TOBACCO.—E. Goodwin, New York City.—*Jan.* 23.—This process comprises the extraction of the unpleasant odors and a portion of the nicotine from tobacco, by subjecting the tobacco to heat in a vacuum or partial vacuum. Also, the infusion of flavoring or sweetening substances in the tobacco while in a vacuum or partial vacuum.

ROTARY WASHING AND SCOURING MACHINE.— J. F. Holmes, Providence, R. I.—*Jan.* 23.—A series of pivoted buckets are mounted at or near the periphery of a revolving cylindrical or drumlike structure, and arranged to alternately maintain a vertical and inverted position and discharge their contents into the interior of the cylinder. The invention also includes the combination of a water-tank, a revolving cylinder, and a series of pivoted buckets, mounted at the periphery of the cylinder, and arranged to elevate water from the bottom of the tank and discharge it downward into the interior of the cylinder. Also, the combination of pivoted buckets, stationary bearing surface, shelving plates, and revolving cylinder.

ELASTIC RUBBER VARNISH.—G. Hook, Harwich, Mass.—*Jan.* 23.—This is a new composition of matter termed a rubber elastic varnish, and consisting of rubber and boiled linseed-oil incorporated with each other.

STOP-COCK.—J. Maclaren, Scranton, Pa.—*Jan.* 23.—This improvement comprises a stop-cock having a flexible ball-valve opened only by the pressure of the fluid beneath, said ball valve having a horizontal rotation on its seat, and being guided by a stem which ascends freely into the screw-plug by which the ball is pressed down upon its seat.

BRAKE FOR SEWING-MACHINES.—N. F. Palmer, Brooklyn, N. Y.—*Jan.* 23.—This apparatus is constituted by an automatic belt-brake composed of a lever, frame, and cushion, arranged in suitable relation with each other.

PRESSURE ACCUMULATOR.—W. D. Grimshaw, Ansonia, Conn.—*Jan.* 30.—This invention relates to devices for accumulating power, by means of compressed air, in hydraulic presses and other apparatus of a similar description, in which there is naturally an irregularity of action and temporary stoppage each beat of the pump, which is very detrimental and objectionable in some kinds of work; hence, the use of compressed air between the pump and the plunger of the press has been found very advantageous by accumulating pressure, and giving a steady and elastic action to the plunger. But in cases where a heavy pressure is required, much difficulty has been experienced in storing the air, owing to the heat generated in compressing it, which interferes with the close fit and working of the valves of the pump employed in producing it, and is otherwise objectionable; also, when such compressed air acts upon the surface of the water through the intervention of pistons, much difficulty is experienced in keeping the latter tight, and the complication of such an arrangement is a drawback to its adoption. This improvement consists in a novel construction of pressure accumulator, in which a series of reservoirs in valvular communication above and below is used, the one of said reservoirs being provided with an inlet at its lower end, and the other or succeeding reservoir having an outlet at its upper part arranged to extend downwards within it, whereby a charge of compressed air may be stored in the reservoirs through the direct agency of the water without the intervention of pistons, and a highly compressed force be conveniently obtained upon the surface of the water in its way to the press, free from all overheating.

PUMP.—Joseph W. Hopkins, New York City.— *Jan.* 30.—This invention relates to pumps in which the valves are arranged to work in boxes or cylinders outside of the pump barrel, and it consists, firstly, in a construction of such boxes or cylinders whereby the same bolt that serves to tie the opposite heads of said boxes or cylinders together, and to hold them to their places, also answers as a guide for the valves. The invention also includes a construction of the heads of said boxes or cylinder, whereby they are made to form the seats and ports for the valves.

VALVES FOR STEAM-ENGINES.—Joseph W. Hopkins, New York City.—*Jan.* 30.—This invention consists in a combination, within a valve or steam-chest, of an oscillating abutment and a slide-valve, with attached cylinder, the abutment being arranged within the cylinder, and being provided with inlets and outlets for operation in concert with passages in the slide-valve, and with the ports or passages of the engine cylinder, so that, on turning the abutment at intervals alternately in a reverse direction, steam is admitted to and exhausted from opposite ends alternately of the valve cylinder to throw the valve. Said improvement is applicable to steam-pumps as well as to steam-engines.

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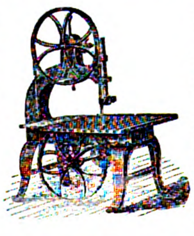

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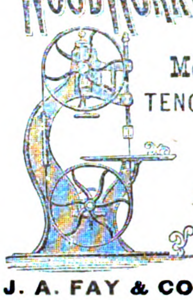

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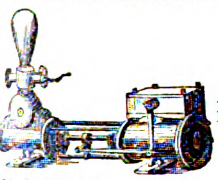

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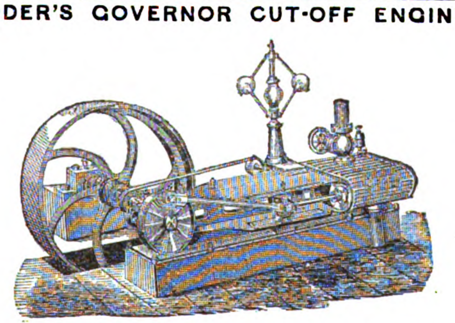
22—Vol. 12

RIDER'S GOVERNOR CUT-OFF ENGINE



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FOOT OF WEST THIRTEENTH STREET, NEW YORK.
The prominent features of this Engine are—
Economy equal to any.
Perfect regulation of speed by Cut-off.
Entire absence of delicate or complicated mechanism.
Simplicity of design and non-liability of derangement.
Requiring no more care than common Engines.
NOTE.—This improvement can be applied in many cases to existing Engines.
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In Economy, Durability, and Fast Cutting, the
UNION EMERY WHEELS AND HONES
are not equaled. They were awarded the
HIGHEST PRIZE
At the American Institute Fair, New York, and at the Industrial Exposition, Cincinnati, Ohio.

TRADE MARK.
THE UNION STONE CO.
Manufacture Solid Emery and Corundum Wheels, Coarse Hand Stones for cleaning castings and other rough work. Fast-cutting Oil Stones for tools, to be used instead of a grindstone. Fine-grained Hones and Oil Stones for putting a keen edge on tools, razors, etc. Emery and Corundum Slips for various purposes. Artificial Stone Machines, Emery-grinders, Saw-gummers, Diamond-tools, Oil Stone Holders, etc Send for circular and price-list to JOHN F. WOOD, Treasurer, 29 Kilby Street, Boston, Mass. Branch Office, 93 Liberty street, New York. 19 to 18 Vol. 14*

ENGRAVINGS OF NEW INVENTIONS.
WE would call the *special attention* of INVENTORS and PATENTEES to the advantages which must result from having engravings of new machines, tools, etc., published in the AMERICAN ARTISAN. The illustrations shown in the present number are fair specimens of the skill and taste of our artists. We are prepared to execute such engravings *at short notice* and *very moderate prices*—in fact, we require only the mere cost of the engraver's labor, charging nothing for a large amount of space devoted to descriptive details, and (whenever requested) we shall subsequently send the engraved blocks to the inventor by express, for use in circulars, handbills, or other purposes.
None but ORIGINAL illustrations—preferably executed by *our own engravers*—will be published in the AMERICAN ARTISAN. Distant patentees desiring to have their inventions illustrated and described in our columns, should at once send us a small model of their machine, by express (prepaid); or mail a good photograph, together with their LETTERS-PATENT, to our address. We will then promptly examine the same, and return a reply, stating the precise expense of the engraving, the payment of which will be always required in *advance*. Address models, documents, etc., for the above object, as follows:—
BROWN, COOMBS & CO.,
Publishers of the "AMERICAN ARTISAN,"
189 Broadway, New York City.

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MECHANICAL AND LANDSCAPE PHOTOGRAPHERS,
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The Root Wrought-Iron Sectional Safety Boiler.

IMPROVED AND PERFECTED BY FOUR YEARS' EXPERIENCE, AND THE SALE OF NEARLY FIVE HUNDRED BOILERS FOR ALL MANNER OF USES.

It has been our aim to produce a boiler constructed entirely of uniform and interchangeable parts, perfectly safe from explosion, easily enlarged or diminished in size, all parts accessible for cleaning, repairs, or removal; also, economical and durable.

Such a Boiler we now offer to the public, and shall constantly keep on hand all parts ready for shipment, by which new Boilers may be furnished, or any of our Boilers in use may be enlarged, or any of their parts renewed at short notice and small expense.

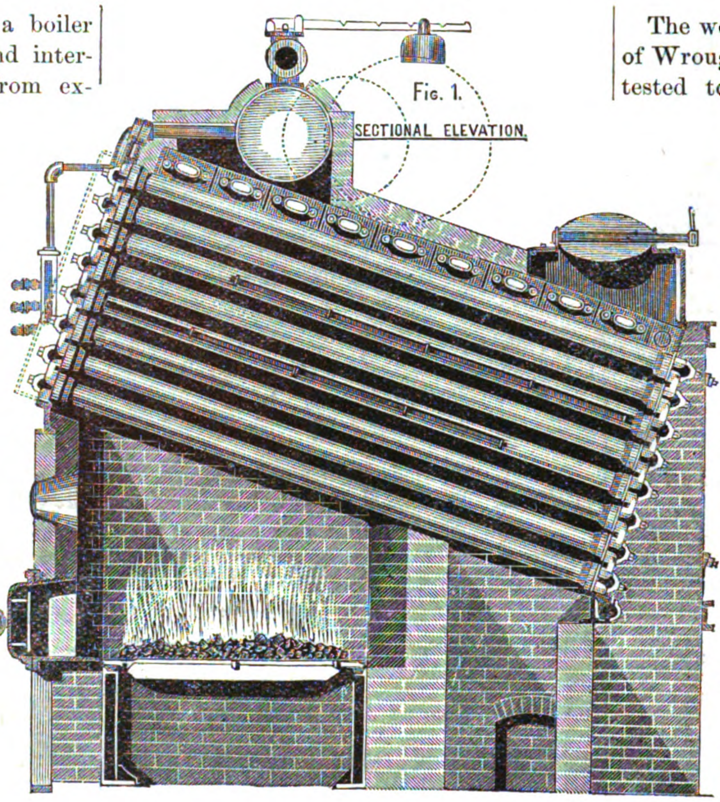
The distinctive claims presented by this boiler are:

Safety from Destructive Explosion,

THE UTMOST DURABILITY,

The Highest Economy of Fuel,

REASONABLE PRICE.



The working portion is composed entirely of Wrought-Iron Boiler Tubes, which are tested to a pressure of 500 pounds per square inch. The largest Boiler is equal in strength to the smallest, as all are composed of a greater or less number of the same parts, uniform in size and strength. This peculiarity of construction secures very *light weight* and small size of parts.

Great Portability.

The largest Boiler can be carried into the most difficult places, through doors and down common stairways where necessary.

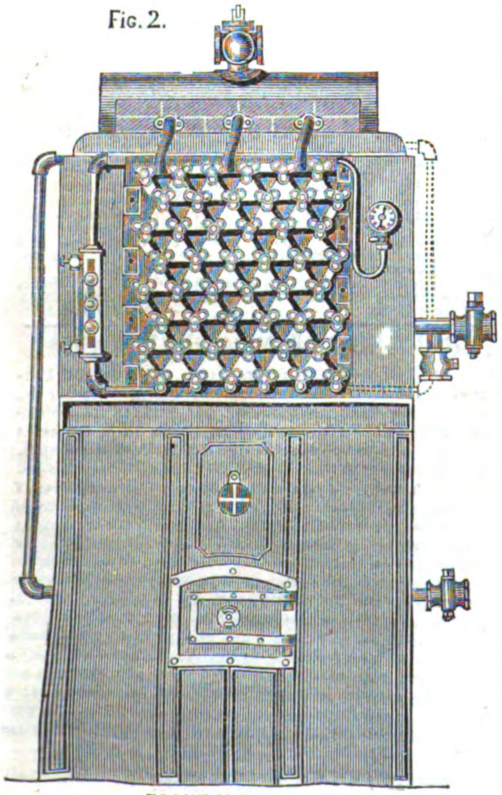
VERY CHEAP FREIGHTS,

Owing to very light total weight and low freight classification.

Permits mule transportation in mining and mountain regions.

Easy enlargement or reduction of size, without disturbing foundations or side walls.

Fig. 2.



FRONT VIEW

Ready and cheap removal and renewal of injured parts without disturbing the rest of the Boiler, thus rendering it as good as new.

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Examination, Cleaning, and Renewal.

Far less cost and time for setting; the greatest compactness.

Furnishes Dry Steam.

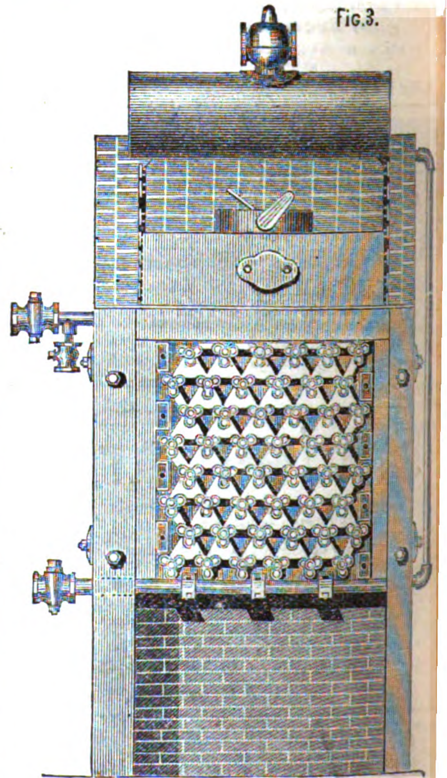
Is a very rapid generator, raising steam to start the engine in from ten to twenty minutes, from cold water; and does not require an educated engineer to accompany it from the works, erect it, and remain to work it.

It is especially adapted to the sales of Engine Builders and Machinery Dealers, as it is not necessary to keep a boiler of each size on hand in order to have an assortment of sizes; but a moderate stock of Tubes, fitted with Heads and Return Bends, can be put together to form any size required.

Liberal terms of sale are offered to the trade.

Boilers constantly on hand. Price Lists, Testimonials, Estimates, Drawings, etc., promptly furnished.

Fig. 3.



BACK VIEW

ROOT STEAM ENGINE CO., 500 Second Av., cor. 28th St., N. Y.

N.B.—We are prepared to arrange with responsible parties, who are using a large amount of Steam Power, to replace other styles of Boilers with the Root Boiler, and guarantee a saving of fuel for a reasonable time, to pay all expenses of such change.

AMERICAN ARTISAN.

A WEEKLY JOURNAL OF ARTS, MECHANICS, MANUFACTURES, ENGINEERING, CHEMISTRY, INVENTIONS, AND PATENTS.

VOLUME XIV. New Series. } NUMBER 7. NEW YORK, FEBRUARY 14, 1872. { $2 00 PER ANNUM IN ADVANCE. SINGLE COPIES, FIVE CENTS.

CONTENTS OF THIS NUMBER

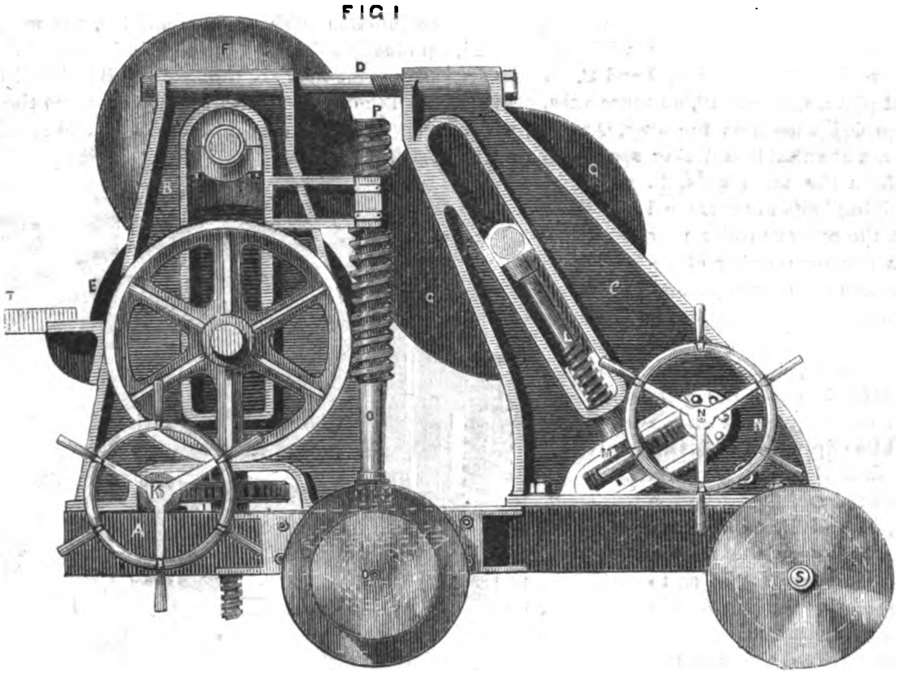
[Illustrations are indicated by an asterisk.]

Machine for making Curved Pipes.

THE curved pipes manufactured of brass and copper are ordinarily formed of two parts, each of semicircular section, the two bolted together and brazed. Such parts are usually raised and planished with hammers, and this is a long and laborious operation. Instead of this, Messrs. Penn & Hounsell, of Greenwich, England, propose to employ for this purpose three rollers, namely, a pair of rollers, one convex and the other concave on the face, the curvature corresponding with the sectional form of the half pipe to be produced, while the third roller is behind this pair, and is so set that, when a strip of metal to form a half bent pipe is passed between the rollers of the pair, it comes against the third roller, and is thus bent to a regular curve, the radius of which depends on the position of the third roller in relation to the pair. The edges of the metal strips are made true and parallel before they are brought to the machine, and edge guides or equivalent arrangements are provided to prevent the strip twisting whilst it is being bent. The curves may be made in continuation of straight lengths in the same piece of metal. The illustrations herewith given, as also the sketch of the construction and *modus operandi* of the machinery, are taken from *Engineering*.

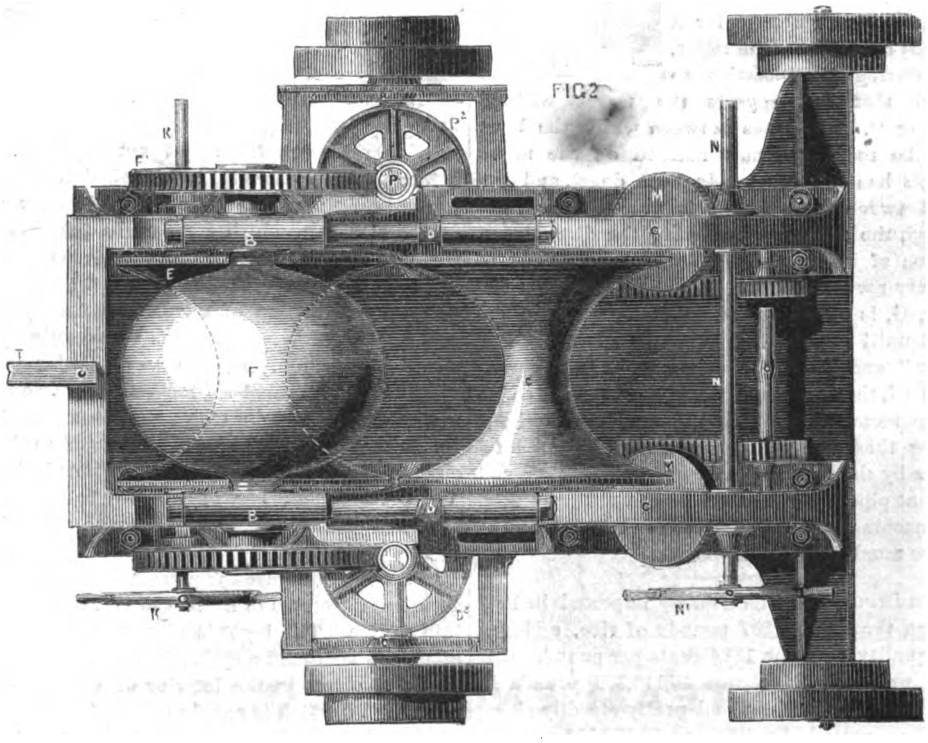
In the engravings which we annex, Fig. 1 is a side view, Fig. 2 a plan, and Fig. 3 a back view of the apparatus. In these figures, A, A, is a base-plate, on which is permanently fixed the standard, B; and C is another standard, which is adjustable on the base-plate to and from the standard, B, to admit of rollers of different diameters being employed. The base-plate is slotted to allow of this adjustment; D, D, are bolts connecting the standards at the top, they are threaded for the length required for the adjustment; E, F, and G are the three rollers employed to produce the half or part of a bent pipe which the coppersmiths call the "back," that is to say, the part which has the concave of the half pipe on the inside of the curve or bend. In this case, as will be seen, the lower roller, E, in the standard, B, is hollow on the face, and the upper roller, F, is convex; they are of the same curvature, excepting the allowance which is made for the thickness of the strip metal which is passed between them. The third roller, G, is like the roller, E.

FIG. I



MACHINE FOR MAKING CURVED PIPES.

FIG. 2



When it is required to produce the other half or part of the bent pipe called by the coppersmiths the "saddle," and which has the concave of the half pipe on the outside of the curve or bend, the rollers, E and F, are taken out and replaced with the convex roller, F, below, and the concave roller, E, above; the roller, G, is also taken out, and a convex roller like roller, F, is substituted. Thus for each size of bent pipe to be made the machine is supplied with four rollers,

two convex and two concave, but three rollers only are in use at a time. The rollers represented in the engravings are the largest for which the machine is adapted; but the machine is provided with several sets of rollers for pipes of different sizes.

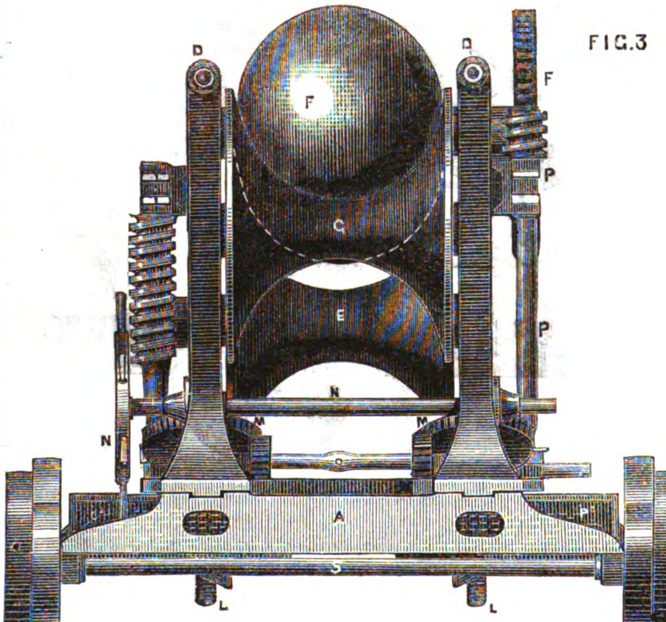
The bearings of the lower roller in the standard, B, are arranged to slide in guides on the standard, and they rest on screws, H, which can be moved vertically in their sockets in the frame by turning the nuts, I, which form parts of worm-wheels with which worms on the axis, K, gear. K^1 is a hand-wheel by which this axis is turned. In a similar way the bearings of the roller, G, can be moved along guides in the standard, C, by screws, L, nuts and worm-wheels, M, and an axis, N, with worms and a hand-wheel, N^1, upon it. The rollers, E and F, are driven by worm-wheels, E^1 and F^1, on their axes; they gear with O^1 and P^1, respectively on vertical axes, O and P. There are beveled pinions, O^2 and P^2, on these axes, gearing with beveled wheels on the axes, Q and R, which are driven at suitably differing speeds by driving belts from the main axis, S. The driving belts are arranged so that the concave roller may make a greater number of rotations than the convex roller.

In working the machine, a suitable strip of copper having been prepared, and a center line marked upon it, it is clipped centrally at one end in a vise-like clip which slides on the horizontal guide, T; it is then entered truly between the rollers, E and F, to a center line marked upon the rollers. These rollers are set so as to commence the bending of the strip to a trough-like form, but without putting too heavy a strain on the metal. The passages of the metal between the rollers are repeated (the rollers, E and F, being set closer together at each pass) until the metal is bent suitably for a straight half pipe. The roller, G, is during this operation so placed that it supports the metal without bending it. The lines between which the bend is to be made are now marked on the metal (if this has not previously been done), and the part between these marks is passed to and fro through the rollers by reversing the direction of rotation of the main driving-shaft by means of ordinary reversing gear, and simultaneously the roller, G, is raised so as gradually to bend the metal until the desired curve is attained. The "back" and "saddle" having been in this way produced, they are notched together, and the edges of the metal beveled in the manner usual for joining these parts; they are then soldered together by the ordinary operation of brazing, and the bent pipe is finished off in the ordinary way. The machine is well contrived, and is calculated to save much hand-labor.

RICE IMPORTS.—This country imported in 1866 no less than 76,209,397 pounds of rice, and the first quality sold for 13½ cents per pound. Our home product, which was 20,118,600 pounds in 1866, has risen rapidly and pretty steadily since, till it amounted, in 1871, to 92,000,000 pounds. Meantime, the price of the first quality has fallen to 9 cents per pound.

French Manufacture of Tin-lined Lead-pipe.

"REGARDING the fabrication of tin-lined lead-pipe," says M. Tresca, in a recent report to the Société d'Encouragement, "the details of manufacture are very curious, and require a special plant, as much for the casting of the ingots as for the fabrication of the pipes. The casting of the ingot is made in a metal mold, in which a large tube of lead is first cast, and then inside this tube a second one of tin. In the center of the mold is placed a mandrel of the same diameter as the lead tube, extended on the lower side by a smaller mandril of the inner diameter of the tin tube. After casting the lead, which enters the annular space from below, it is left to solidify, then by the assistance of a hydraulic press, which is used in conjunction with an accumulator, the mandril is gradually raised. Then the tin is poured through an opening made in the mandrel itself, and thus is filled the annular space corresponding to the difference in the diameter of the large and small mandril.



"In order that the tin may attach itself thoroughly to the lead, it is necessary that the surface should be always fresh and not oxydized. To achieve this the mandrel is furnished at the point corresponding to the change of diameter with an annular tool, which scrapes the inner face of the lead at the moment that the tin is cast on it. This practical arrangement works well, and assures the formation of a thin bed of alloy interposed between them, and which resists subsequent mechanical action. In this way tubular ingots 15¾ inches high and 7¾ inches diameter outside are produced, and in which the thickness of the tin is calculated so as to reduce itself to the desired ultimate dimensions when the pipe is drawn. The perfect centering of the tin is assured by the guidance of the mandrel in the axis of the ingot.

"A powerful hydraulic press connected with an accumulator serves to transform this hollow ingot into a pipe. The ingot is placed on the plunger of the press around a cylindrical rod. This rod is extended above in the interior of a cylinder, the diameter of which is equal to that of the exterior of the ingot attached to the fixed cross-framing of the press.

"The cylindrical rod finishes above in a reduced diameter equal at the end to the bore of tube drawn out. On the fixed frame a movable framing is made to descend by the aid of a small hydraulic press, and this surrounds the reduced end of the rod, leaving an annular space equal to the thickness of the pipe. In this manner, by the aid of adjusting screws, dimensions of the pipe are fixed, and the main press is put into action. The ingot rising gradually along the cylindrical rod, becomes engaged in the annular space between itself and the adjusted framing, and it is thus forced to extend itself in the one desired direction, and rises in the form of a pipe, to be wound off on spools as it is gradually forced out.

"The fixed frame which the ingot passes immediately before being drawn, is heated to a temperature of 248° Fahr., by the directed flame from a furnace.

"When the ingot is almost exhausted, the press is stopped, and the apparatus dismounted by running back the adjusting screws, and raising the movable framing by means of the second auxiliary press; about 3 feet of piping is lost, and the plunger, drawn down to the bottom of its stroke, is provided with a fresh charge. The thickness of the drawn pipe remains very well proportioned to that of the ingot, as the two metals are drawn simultaneously under the same condition, and each unit of cross-section of the ingot is thus transformed into a corresponding length of finished tube. It is then easy to regulate the thickness of the ingot in such a manner as to obtain in the pipe the relative thickness required in practice. The tin adheres perfectly to the lead. It has been shown by many experiments that it is impossible to separate them, even by bending the pipe or subjecting it to the blows of a hammer.

"M. Hamon took out his patents in 1867. His manufactory, established first at Nantes, was afterwards removed to Paris, where it was greatly extended. The quantity of piping he sold in 1869 amounted to 300,000 kilogrammes. Architects and house proprietors have largely adopted the tin lining for service-pipes, and it is generally admitted that this lining removes all danger from the dissolution of the lead and its consequent sanitary dangers. The soldering of these compound pipes presents some difficulties. The tin melts whilst the soldering-iron is applied, offering the double inconvenience of denuding the lead, and obstructing the bore. Skill and care are necessary for avoiding these evils.

"The fitting of cocks also presents the same difficulties, but they can be attached with sockets, since hammering the pipe does not detach the tin. It is also a delicate work to add a new fitting to a pipe already in place.

"At one time the relative prices of tin and of lead were such that, taking into account the greater resistance offered by the first metal, and consequently by diminishing the total thickness of the pipe, it was possible to obtain pipes of the same strength at the cost of lead. It is not so to-day, and this circumstance involves an increased price as regards the compound pipes, which would tend to reduce their general adoption if the sanitary phase of the question be not properly considered. Service-pipes of tin and lead cost at present about 9*d.* a yard more than corresponding ones of lead alone. It has to be remembered that in diminishing the thickness of the pipes they are rendered more susceptible to the influence of exterior shocks, and besides this there is more loss in selling them for old metal, because the price of the tin is lost."—*Engineering*.

Parisian Steam Road Rolling.

THE following is an extract from a lengthy statement by Messrs. Gellerat & Co., the parties most actively identified with the use of the steam road roller in Paris:—

"As long ago as 1860, experiments in road rolling by steam engines were made in Paris. These experiments, again taken up in 1864, and continued by Messrs. Gellerat & Co., induced, in consequence of comparative trials between the horse road rolling and steam road rolling, the engineers employed by the Paris municipality to conclude, in 1865, a contract with the company. This has given both extension and a regular and permanent character to the application of this process. The contract, made for six years, obliges the company to keep permanently at the disposal of the city of Paris seven steam road-rollers of the construction patented by them. These rollers are principally intended for rolling the macadamized roads of Paris and of the Bois de Boulogne and Bois de Vincennes; but they can also be used for setting paving stones and for rolling the foundations of paved roads. The contract fixes the maximum and minimum diameters of the two carrying rollers of each engine, the maximum width of the machine, the speed of travel of the engines, and the weight per meter run of the width of the external diameter of the carrying rollers. The work done is paid in the compound ratios of the distance traversed by the engine at work on broken stone to be rolled, and of the weight of the engine itself. The unit of the accounts is the kilometric tonne; that is to say, 1,000 kilogrammes of the weight of the engine carried a distance of 1,000 meters. This unit is paid for at the rate of 0·50 francs during the night and 0·45 francs during the day. As regards the average weight of the engines, it is determined by weighing, checked by both parties to the contract, and the distance passed over is given by a counter driven off the rollers.

"The distinctive qualities of the rolling engines employed in Paris are:—'The entire utilization, for the progression of the machine, of its weight; and the identity of the front and hind parts of the engine—an identity which allows it to work with the same ease in both directions, and, consequently, to advance in either direction without turning round. The two carrying-rollers are both drivers, and are propelled in the same way, but separately, by the steam-engine. We have to add that the engines can turn in a minimum radius of from 10 to 15 meters—32 feet to 48 feet—according to their dimensions. Thus, with their power of going either backwards or forwards, this allows them to work in the most narrow streets and to pass the sharpest corners. The application of the whole weight for obtaining adhesion gives the Gellerat Company's engine great traction power—a power often entirely called into play, especially when the metalling is of bad quality and the foundation of a yielding nature. A steam road roller without this power would often be incapable of moving itself on freshly laid metalling, and, *a fortiori*, of dragging itself out of the many difficult positions to be encountered in making new roads. The average weights of the Gellerat engines, in the order in which they are used, are 17, 24, and 30 tonnes of 1,000 kilogrammes—in English weights, 16 tuns 14 cwt. 2·5 qr.; 23 tuns 12 cwt. and 1·6 qr., and 29 tuns 10 cwt. and 2·094 qr. respectively. The weights per meter run of the rollers are 6,000 kilogrammes for the smallest engines, and 8,000 kilogrammes for the two other sizes. Engines of these graduated sizes have been able to execute all the work which has offered itself up to this day. The lighter engines are more particularly suited for new work under difficult conditions; the heavier rollers, which can also be used on new work, are more suited for maintaining roads. They can roll in a single night a very considerable road surface. The maximum speed with which the engines are to work has been fixed at 4 kilometers, or 2 miles 854·5 yards per hour. This speed, but seldom attained, is still less commonly exceeded. We may estimate, as a general rule, the speed of 3 kilometers, or one mile 1,520 yards per hour, as the average velocity developed from the beginning to the end. of an ordinary day's work. Rather less at the beginning, when the draught is considerable, it increases with the degree the binding of the road approaches completion.

"Since 1866 there has been steam-rolled in Paris a total volume of 32,000 cubic meters, or 41,857 cubic yards of metalling of different kinds, such as flints, gravel, broken stones, more or less hard millstone grit, porphyry, and trap—the last a metamorphic quartz rock. These different materials are all rolled in the same way, with slight differences depending on the manner they behave under the action of the rollers. Pebbles and gravel, which at the outset are very movable under the rollers, form a wave in its front. A small quantity of water is sometimes sufficient to diminish this tendency; pebbles bind easily with the addition of sand. These last materials are cheaper than those generally used in Paris, but they are much employed for keeping up roads subjected to considerable traffic. Millstone grit, still more binding than the preceding materials, is easily rolled, and affords an easy draught and ready maintenance. Porphyry and trap, being much harder, require to be longer rolled. The crushing together of the materials is slower, and the binding more difficult; but when this double result is obtained, the road offers a considerable resistance. On these materials the heavier engines are particularly efficacious.

"The working of the engine remains to be spoken of. We are here confronted by a rule which is never departed from, whether as regards a road being rolled along its whole breadth, or only half its breadth, though it principally relates to the case in which the whole width is being rolled. The operation is always begun at the sides. The roller at first executes a certain number of passages over one of the edges of the macadam. When the stones begin to be brought together the surface is slightly watered from a barrel or by a jet, and by means of a spade a very thin layer of the sand provided is spread. At each passage the roller is gradually brought nearer to the crown of the road. The operation is continued in this way for some time, and when the one side of the road is sufficiently bound, the other is begun with, and brought to the same state as the first. The central part is done last and in the same mode. The roller thus passes over the whole surface, staying longer over those portions less squeezed together than the others. During the operation the road is moderately sanded and watered. As we have said, towards the end the excess of water runs to the surface, taking with it also any excess of binding material. The rollers then produce no impression. By this means a smooth hard road is obtained, and it can be at once open to traffic. The heaviest carts leave no trace.

THE study of photography is now obligatory for military students at the Army School in Paris. The immense value of a knowledge of this science in war is now properly appreciated.

COMMUNICATIONS

TO CORRESPONDENTS.

We wish our readers to understand that, in freely publishing communications, we do not hold ourselves responsible for the opinions of our correspondents, inasmuch as we may occasionally publish views opposed to our own.

Straw for Fuel.

MESSRS. EDITORS:—In the AMERICAN ARTISAN of Jan. 24, 1872, Vol. XIV., No. 4, we notice an article headed "Straw for Boiler Fuel," in which you speak of this article being used first for fuel in Hungary, and within a short time brought as something new to this country, and first used on the Pacific Coast on trial. More than fifteen years ago straw was used for fuel in the machines made by these works to thrash rice, and the furnaces of almost every machine as now built for that purpose are adapted to burning straw. Our planters find it much more economical than wood.

JOHN F. TAYLOR & CO.

CHARLESTON, S. C., Jan. 30, 1872.

Polishing Enameled Paper.

THE polishing of enameled paper is a very simple and rapid process. The sheets, previously prepared with the enameling material, are laid in heaps convenient to the operator. In an establishment in Albany, N. Y., seventy-five young ladies are seated at small tables in the polishing room. Each takes a single sheet from the pile at her side, and places the edge of it on a slightly concave band of very hard wood. Up and down this band of wood an agate wheel, four inches in diameter, and an inch and a half thick, runs with considerable velocity and a firm pressure. The girl slowly and carefully pushes the paper from her, every friction of the wheel leaving a surface as brightly polished as a new varnished boot. A sheet is polished in a few seconds. One variety of this embossed paper is very pretty—the crystallized-looking paper known as "snow-flake," which is so often seen outside boxes. The appearance of snow-flakes is given to it by mixing a solution of rock-salt, wax, and vinegar with the color. This causes the color to disintegrate and shade itself, and to fly off in star and diamond shapes, bearing a fanciful resemblance to snow. No less than forty thousand reams of embossed paper of all colors are manufactured annually at this factory, using up five tuns of plain white paper a day, and 3,500 pounds of color a week. The general business of the company, who employ 180 women and 30 men, amounts to $500,000 a year.

A BUFFALO man must have the credit for the most novel invention yet proposed for propelling boats on the canal. The power is not attached to the boat, but the entire body of water in the canal is moved, and the current thus created is used as the propelling power. The plan embraces a wall laid in the center of the canal its entire length, dividing it into two equal channels. At the head of each level is placed an immersed wheel of peculiar construction, which is moved by a stationary engine, and the action of which is to throw the water from one of the channels into the other. A current is thus created from the machinery in one channel, and toward it in the other.

The Woolwich 35-tun Gun.

THE interest attaching to the never-ending contest between armor and armament has for the present in England culminated in the use of the "Woolwich Infant," the first of a large family in more than one sense. The following is an account of the construction of this monster gun, and the accompanying illustration shows the sectional details thereof :—

This gun is a built-up compound gun of steel and wrought-iron, upon the Fraser system, and consists of :—1. The iron barrel or tube of steel ; 2. The breech-piece or coil of wrought-iron ; 3. The cascable ; 4. The center or coil ; 5. The muzzle or tube ; 6. The outer breech-coil and trunnion-piece.

The inner barrel has been supplied by Messrs. Firth, of Sheffield, and is made from a forging of solid steel that weighs about 6¼ tuns. This steel is of a peculiar kind, which can be hardened without becoming brittle. Hardness is essential for the interior, in order that the bore and grooves shall not be bruised by the studs of the projectiles ; and if the tube were brittle the severe dynamic strains to which it is subjected would probably cause the rupture of the gun ; therefore each block of steel is tested to see that it is of the proper strength and temper, of uniform quality and free from all defects.

The steel block is rough-turned and rough-bored, the breech-end being left solid. It is then tempered as follows : — The tube is placed upright in a furnace, and the fire, chiefly of wood, plays round it until it has become of the temperature previously determined by the particular quality of the block. The tube, being now red hot, is drawn from the furnace, and lowered into a huge bath of oil about 24 feet deep, and it is there left until cool. This operation increases the breaking strength 50 per cent., and to more than double the elastic limit of the material, and causes the surface to become much harder, and thus better resist abrasion.

The tube is again turned and bored ; and in order to discover whether there are any cracks or defects, it is proved by hydraulic pressure of four tuns per square inch.

Having passed all these ordeals satisfactorily, the tube is permitted to take its place as a constituent part of the gun.

The next part of the gun which comes into notice is the coiled breech-piece. The sections of iron of which this part of the gun is made are very large ; and the bars are trapezoidal, *i.e.*, one edge is wider than the other ; because when bent round the mandrel to form the coil, that part which is inside next to the mandrel becomes "upset" or wider, while the outer portion is drawn out and becomes narrower ; consequently, if the bar is to be parallel after it is coiled, an allowance must be made in the section ; the breech-end bar before coiling is 10½ inches deep, 8 inches wide outside, and 6½ inches wide inside, and bent round a mandrel of 16 inches diameter, which the machine does as easily as a rope is coiled around a windlass. The length of bars which compose the coiled breech-piece is 133 feet, and the iron for the complete coil weighs nearly 14 tuns.

The bar, having been coiled, is taken to the steam-hammer, welded, and made into one compact forging.

The coiled breech-piece having been bored to fit the steel tube, and screwed to receive the cascable, is made hot on an enormous gridiron, until the diameter of the hole has expanded sufficiently to go on to the steel tube. While this heating has been going on, the tube has been placed mouth downwards over an iron pipe which projects a stream of water up against the end of the bore, and keeps it cool (so that it may not lose the temper given to it in the process of hardening) when the hot breech-piece is placed over it. Everything being ready, the breech-piece is lifted off the gridiron, carried to the steel tube, lowered on to its place, and allowed to cool.

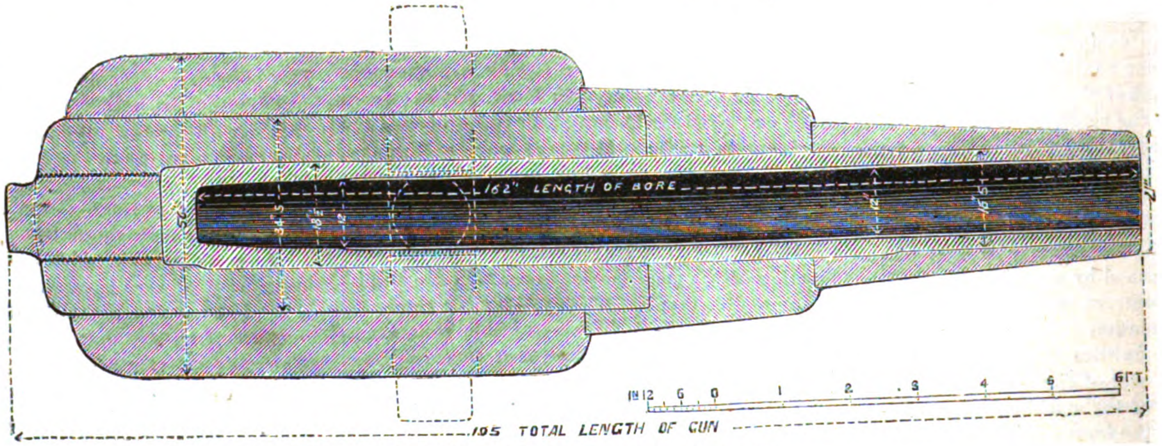
The cascable is that portion of the gun which is screwed to the breech-piece, bears up against the end of the steel tube, and projects from the rear ; it is made of a solid forging weighing 1½ tuns, and is turned and screwed into the gun, care being taken that the end of the steel tube and the face of the cascable are accurately fitted together.

The center coil is the short, thick coil in front of the trunnion, formed of two bars of iron, 7 by 6 by 4½ inches, 76 and 118 feet long respectively, the weight of the two together being nearly 11 tuns. The shorter bar is first coiled on a mandrel, and the longer bar is coiled upon the outside of the first, but in a contrary direction, for the purpose of breaking joint, so that one seam may not lie exactly over another. This double coil is taken to the steam-hammer and welded into one mass, and, to insure that there shall be no spaces between the inner and outer coils, a mandrel considerably larger than the hole is driven by the powerful steam-hammer into the coil while it is still at welding heat. The coil is then bored, turned, and shrunk on to the steel tube in a similar manner to the breech-piece.

The muzzle-tube is that portion of the exterior of the gun which reaches from the center coil to the muzzle. Receding from the breech of the gun, the strains become less and less, therefore less thickness is required, and the bar which composes the muzzle-tube is made of different dimensions in different parts, the strongest being nearer the breech. The sizes are as follows :—7″ by 6″ by 4½″, 28 feet long ; 6″ by 4⅝″ by 4⅛″, 17 feet long ; and 5½″ by 4⅝″ by 4½″, 36 feet long ; the total weight about 3½ tuns. These bars, being made up into one coil of single thickness, are bored, turned, and shrunk on to the gun.

It is found more convenient to complete the interior of the gun before the large trunnion coil is put on (though the first gun after being finished and rifled with a bore of 11·6 inches was rebored and rerifled to a caliber of 12 inches). The gun minus the trunnion coil is therefore taken to the boring machine and bored to the exact caliber, and the powder-chamber of the gun made to the taper form adopted in the service. It is then taken to the rifling machine, another marvel of ingenuity, by which any form or twist can be given to the groove in the gun. The twist adopted in the 35-tun gun is that known as the increasing spiral, *i.e.*, the angle of the groove with the bore of the gun continually increases from the breech to the muzzle of the gun, the groove starting at the breech parallel to the axis (or angle equals 0), and by the time it gets to the muzzle the angle degree is equal to one turn in 35 calibers. There are nine grooves, the section of which is that known as the Woolwich groove.

Next comes the large breech coil incorporated with the trunnion. This coil is made of bars of the same sections as those of the center coil, but longer ; the inner bar is 170 feet long, weighs about 9½ tuns, and is coiled on a mandrel in diameter about 30 inches ; the second bar, 212 feet long and weight 11¼ tuns, is then coiled on the outside of the first, and the double coil removed to the furnace, heated to a welding heat, and welded under the steam-hammer ; after which the upper portion is turned down to receive the trunnion.



THE WOOLWICH 35-TUN GUN.

The trunnion is forged by welding upon each other slabs of iron, until a sufficient quantity is obtained in one mass, when a small hole is punched through the whole of the slabs, and the hole enlarged by taper punches, increasing in size, being driven in one after the other ; the trunnions proper, *i.e.*, the part upon which the gun swings when in its carriage, being drawn or forged out at each end. This forging weighs rather more than 12 tuns. The trunnion, having been bored out, is put upon that part of the breech coil already turned to receive it, a short coil is put in front, and the whole mass, now weighing about 26 tuns, is placed in the furnace and brought to a welding heat. When sufficiently hot, the coils and trunnion are brought under the steam-hammer, and, after a few blows, are inseparably united. When cool, this coil is put through the operations of boring and turning similarly to the others, the lathes in which they are turned being magnificent specimens of machines, each weighing nearly 100 tuns. When done, the coil is shrunk on to the gun, which has previously been rifled ; and now the gun is complete and ready to be vented for proof.

From the foregoing description it will be seen

that about 70 tuns of iron and steel are required to manufacture one of these monster guns, and the result is a gun of very superior quality. No other nation is in possession of a gun that can at all be compared with the Fraser gun for economy. In it are embodied all the advantages of the coil system of construction, without those defects which have hitherto been connected with that system, and which rendered it impossible to construct large guns strong enough to resist the enormous strains that are developed by the heavy projectiles and large charges of powder now in use.

The prominent features that distinguish the Fraser from the Armstrong guns are the inner and outer coiled breech-pieces. The latter immense coil, in particular, embraces two points:—One, that the coil is very long, and the trunnion is welded so as to become one with it, and the whole section of the gun is available for longitudinal strength. The other, that this exterior coil is made of great thickness, in order that the interior coils of the gun may be powerfully grasped and compressed without materially detracting from the strength of the outer coil, so that there may be a reservoir of strength in it at the time of firing the gun; by this means the entire section of the gun is more usefully employed to resist a bursting strain, as the various parts are more equally strained when the gun is fired. The coils of the Armstrong gun were strained to such an extent by the shrinkage upon the gun that they were in a state of extreme tension all through, and ready to break at any sudden shock, having no reserve of strength in them. This difference between the two guns will be more clearly perceived when the thicknesses of the coils of each gun are compared; thus, the coil of the 35-tun gun is 10¾ inches thick when finished, whereas the coils of the 25-tun Armstrong guns are 2½ inches thick. The Armstrong system did not aim at making the thickness of the coil in proportion to the gun; but it is an essential feature of the Fraser guns that the outer coil must increase in thickness with the size of the gun. Moreover, the Armstrong guns, by being made in short, thin coils, did not possess sufficient longitudinal strength with coils alone; a *forged* breech-piece was therefore used, in which the fiber of the metal ran longitudinally through the gun, thus giving end strength; but the end strength thus obtained was at an enormous sacrifice of transverse strength or the power to resist a bursting strain.

The Fraser system of construction has not yet, however, solved the problem which has so long occupied the scientific world, "Which is the victor, guns or armor-plates?" The gun now made will, it is true, pierce the most powerful armor-clad vessel yet in construction, if it will endure the powder strain, and there could be even a larger and more powerful gun made if there were certainty of success in the manufacture, whereas the limits of weight and thickness that could be constructed to float are, if not already reached, within a short degree of the utmost limit attainable by ordinary ships.

NORTHERN LIMIT OF THE OYSTER.—Oysters, it is stated, cannot be grown in the seas of the province of Quebec, the northern limit of the habitation of this shell-fish on the east coast of North America being Carraquette Bay, on the northeastern point of New Brunswick. Attempts have been made to plant oysters in Gaspé Bay, but the culture failed, in consequence of the extreme coldness of the water, which even in the summer is only a few degrees above the freezing point.

Properties and Uses of Magnesium.

FROM the leading methods employed in the manufacture of magnesium, it will be apparent that the chief difficulty in the way of an unlimited supply of the metal is in the cost of the sodium now employed as a reducing agent. This would not long prove an obstacle if the demand for magnesium was sufficient to create a market. There is no good reason why metallic sodium should not be made at a few cents a pound, and the corollary naturally follows that the cognate metal—magnesium—ought to be easily reduced in price. The properties of magnesium have been pretty thoroughly investigated within the last few years, since its manufacture has been conducted on a large scale, and chemists have obtained inviting glimpses of important uses of which it is capable as soon as a reduced cost puts it within reach of all who may require it. Magnesium is a hard, silver-white metal, not easily oxydized, excepting in moist air; it melts at a red heat, and can be volatilized and distilled the same as zinc. Its specific gravity is 1·74, being considerably lighter than aluminum, and a cubic foot of it would weigh a trifle over a hundred pounds, which is considerably less than the average of building stone. A small piece of it can therefore be made to cover a larger space than any of the metals actually employed in the arts. As to its tensile strength and crushing resistance, when cast in large bulk, we have very little information. It is malleable, ductile, apparently more easily drawn into wires than hammered into leaves. Dilute acids attack it readily, and also ammonia salts, with evolution of hydrogen gas. When thrown on hot hydrochloric acid it takes fire, so active is the decomposition. It was for a long time supposed that magnesium would not amalgamate with mercury, but it has recently been found that at a high temperature the union of the two metals takes place, and the amalgam produced readily decomposes water. One of the earliest applications made of magnesium was founded on its property of emitting a brilliant light when burned. Two ounces of the metal burned for ten hours will give a light equal to that produced by the combustion of seventy-four stearine candles, of five to the pound, consuming twenty pounds of stearine. If the data upon which the above calculation is based be correct, we have, in this example, a striking illustration of the high illuminating property of magnesium. The light emitted by the burning metal has all of the active force of sunlight. Any chemical change that can be produced by the sun can be repeated with the magnesium light. The explosive combination of hydrogen and chlorine, the change of salts of silver, the glow of phosphorescent mixtures, the growth of plants, and numerous other experiments can be shown illustrating this property of burning magnesium. Various contrivances have been invented for the practical application of magnesium for illuminating purposes. In one of them the metallic ribbon is fed off a reel into the flame of a spirit-lamp, or is left to burn quietly of itself; in another, the magnesium is converted into fine grains and allowed to fall through an opening like an hour-glass upon a spirit-lamp; still another modification employs an alloy of zinc and magnesium. Much use has been made of magnesium light in photographing interiors of caves, catacombs, pyramids, and churches, and in taking portraits, also as the source of illumination for the magic lantern, for microscopic investigations, and for other scientific purposes. The copious white cloud of oxyd of magnesia which is produced during the combustion has proved very inconvenient in confined rooms, and has compelled the suspension of operations every few hours until the air could be freed of the disagreeable fumes. This is not an insurmountable difficulty, as it would be easy to contrive some plan for drawing off and retaining the white oxyd. When an alloy of zinc and magnesium is required, the metals must be fused in an atmosphere of hydrogen to prevent an explosion.—*Prof. C. A. Joy in Journal of Applied Chemistry.*

Asphalt Pavement.

IN a report to the street committee of the city of London on the comparative merits of different sorts of pavement, Mr. W. Haywood, engineer and surveyor to the commissioners of sewers, gives the palm to the Val de Travers compressed asphalt from Neufchatel, which has been extensively used in Paris since 1854, and since October, 1870, has been laid down in Cheapside, at a cost of one dollar currency per square yard, including the concrete, fifty cents per square yard, underneath it.

It has been estimated by M. Leon Malo, a French engineer, that, if all Paris were paved with the Val de Travers asphalt, there would be a saving in the wear and tear of horses and carriages to the amount of $1,700,000 a year.

Capt. Shaw, superintendent of the London Fire Brigade, says that the heavy engines of the brigade travel upwards of twenty thousand miles a year at great speed over the thoroughfares of the metropolis, and that he is convinced that there is less danger in traveling over asphalt than over granite.

Horses falling on granite are, he says, usually more or less injured, but this has not been the case in any instance where they have fallen on asphalt.

Black-brown Varnish for Metallic Bodies.

THE lustrous coat of black with which earthenware becomes coated which is exposed to the action of hot coal-smoke is a commonplace experience enough. Mr. C. Ruscher has conceived the idea of utilizing the property of the empyreumatic oils from coal for the purpose of coating small articles of iron and steel, such as hooks and eyes, buttons, etc. For this purpose, the iron, steel, or other metallic objects are placed upon an iron grating, over a layer of coal-dust about half an inch thick, in a cylindrical vessel 18 inches high. The vessel is then securely closed, and, being placed upon a bright fire, the bottom is brought to red-heat for about a quarter of an hour; it is then taken from the fire, and allowed to cool before it is opened. On the removal of the lid, the metallic articles will be found to be covered with a tough, durable varnish, which does not crack with bending, and will resist a considerable elevation of temperature. The smaller objects he recommends to be rotated over a fire, in a machine like a coffee-roaster, with a small quantity of coal-dust, by by which, he states, the same kind of lustrous black coating is given.

THE engineer of the Alexandria, Va., hydraulic steam fire-engine, while cleaning out his apparatus a few days ago, found three live fish in the pumps. They had undergone some rough treatment since they left the street mains, having lost all their scales, and a portion of their tails, but otherwise were apparently in good condition.

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ISSUED FROM THE UNITED STATES PATENT OFFICE

For the Week ending February 6, 1872,

AND EACH BEARING THAT DATE.

[*Reported officially for the "American Artisan."*]

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123,323.—CIGAR-MOLD.—George Barry, Chicago, Ill.

123,324.—SIGN FOR STREET-LAMPS.—W. Hamilton Bell and John G. Jory, Baltimore, Md.

123,325.—LAMP-CHIMNEY.—Ebenezer Blackman, New York City.

123,326.—ABDOMINAL SUPPORTER.—Mary Georgiana Briggs, Boston, Mass.

123,327.—GAS-BURNER.—Andrew Buckham, Delhi, N. Y.

123,328.—HOLDER FOR REINS FOR HARNESS.—Turner Byrd, Jun., Williamsville, Mich.

123,329.—CORE-BOX.—John C. Chapman, assignor to the Chapman Valve Company, Waltham, Mass.

123,330.—PLOW.—Luke Chapman, assignor to himself and the Collins Company, Collinsville, Conn.

123,331.—DUST-PAN.—Walter M. Conger, Newark, N. J.

123,332.—CHILDREN'S TABLE-TRAY.—Walter M. Conger, Newark, N. J.

123,333.—FUR-SET BOX.—Jason Crane, Bloomfield, N. J.

123,334.—FUR-SET BOX.—Jason Crane, Bloomfield, N. J.

123,335.—SPRING BED-BOTTOM.—William C. T. Davidson, Hannibal, Mo.

123,336.—MANUFACTURE OF FLUID EXTRACTS.—Linus De Puy, Grand Rapids, Mich.

123,337.—DOWEL-GAUGE.—Joseph Er, Cleveland, Ohio.

123,338.—FLANGED COVER FOR SHEET-METAL WARE.—James Fallows, Philadelphia, Pa.

123,339.—MANUFACTURE OF FLANGES FOR SHEET-METAL COVERS.—James Fallows, Philadelphia, Pa.

123,340.—HARNESS-HOOK.—John U. Fiester, Winchester, assignor to Lewis G. Haines, Washington, Ohio.

123,341.—MACHINE FOR MAKING BOLTS AND RIVETS.—John Griffiths, assignor of one-half his right to Nicholas Rahr, Wheeling, West Va.

123,342.—DIFFERENTIAL PULLEY-BLOCK.—Charles Hall, New York City.

123,343.—RECLINING-CHAIR.—William Heath, Bath, Maine.

123,344.—DUMPER FOR RAILROAD-TENDERS.—Thomas C. Hendry, Union Point, Ga. Ante-dated Jan. 19, 1872.

123,345.—STREET-RAILWAY TRACK-CLEANER.—Aaron Higley and Dustin Atwood, Cleveland, Ohio.

123,346.—WASH-BOILER.—Charles W. Howard, Philadelphia, Pa.

123,347.—LIFTING-JACK.—Edwin Hoyt, Stamford, Conn.

123,348.—MACHINE FOR STITCHING BUTTON-HOLES.—Daniel W. G. Humphrey, Chelsea, assignor to Eugene Humphrey, Boston, Mass.

123,349.—COMBINED POKER, LIFTER, AND TONGS.—Peter Lander and Joseph Manthorn, Philadelphia, Pa.

123,350.—STAPLE FOR HAMES.—Josiah Letchworth, Buffalo, N. Y.

123,351.—METALLIC CARTRIDGE.—Isaac M. Milbank, Greenfield Hill, Conn. Ante-dated Jan. 22, 1872.

123,352.—CARTRIDGE FOR BREECH-LOADING FIREARMS.—Isaac M. Milbank, Greenfield Hill, Conn. Ante-dated Jan. 22, 1872.

123,353.—EGG-BEATER.—Harvey Miller, Cincinnati, Ohio.

123,354.—WASHING MACHINE.—Cyrus Milner, Des Moines, Iowa. Ante-dated Jan. 26, 1872.

123,355.—ELECTRIC SIGNALING APPARATUS FOR FIRE-ENGINES.—William H. Mumler, assignor to Lucius A. Bigelow, trustee, Boston, Mass.

123,356.—WATER-COOLER STAND.—William Frank Nickels, Philadelphia, Pa.

123,357.—HORSE HAY-RAKE.—Linus A. Paddock, Pecatonica, Ill.

123,358.—SPINDLE-BEARING FOR SPINNING MACHINES.—Horatio L. Peirce, Taunton, Mass., assignor to George F. Wilson, East Providence, R. I.

123,359.—WAGON-BRAKE.—Munson G. Pickett, Kingston Kings, Canada.

123,360.—TICKET-HOLDER.—John B. Porter and Thomas Reece, Philadelphia, Pa.

123,361.—GRAIN CLEANER AND SEPARATOR.—James H. Redfield, Salem, Ind.

123,362.—ROTARY ENGINE.—John D. Richardson, Houston, Texas.

123,363.—PITMAN AND MODE OF ATTACHMENT TO BAND-WHEELS.—Leonard N. Rouse, Covington, Ky.

123,364.—SELF-ACTING MULE FOR SPINNING.—Wanton Rouse, Taunton, Mass.

123,365.—HOSE.—Joseph Sharp, Cincinnati, Ohio.

123,366.—PROCESS AND APPARATUS FOR CANNING AND PRESERVING MEAT, ETC.—Nicholas H. Shipley, Baltimore, Md.

123,367.—LOCOMOTIVE ENGINE.—Sidney Skillman, Jersey City, assignor to himself and Humphrey B. Dunham, Newark, N. J.

123,368.—TERRET.—George W. Soule, assignor to himself and Josiah Letchworth, Buffalo, N. Y.

123,369.—HAND-RAKE.—George W. Stearns, assignor to himself and David W. Marston, Lebanon, N. H.

123,370.—HAIR TONIC AND RESTORER.—Conrad Stock and William B. Ross, Pawling, N. Y.

123,371.—SCISSORS.—George Turner, Bristol, Conn.

123,372.—EXTENSION-TABLE.—Samuel Edwin Wales, assignor to himself and Chester English, Lebanon, N. H.

123,373.—ROLL FOR PAINTING WIRE CLOTH, ETC.—George F. Wright, Clinton, Mass. Ante-dated Jan. 20, 1872.

123,374.—BALE-BAND STRETCHER.—Logan J. Anderson, Water Valley, Miss.

123,375.—CARRIAGE-WHEEL.—Charles H. Appel, Allentown, Pa.

123,376.—LAMP-BURNER.—Philander Baker, Ansonia, Conn. Ante-dated Jan. 24, 1872.

123,377.—WALL-GUARD FOR FURNITURE.—James L. Brander, Boston, Mass.

123,378.—TIME-LOCK.—John Burge, Circleville, Ohio.

123,379.—LAMP-BASKET.—Patrick J. Clark, West Meriden, Conn.

123,380.—UMBRELLA-SUPPORT FOR CARRIAGES.—Almon Clarke, Sheboygan Falls, Wis.

123,381.—ANIMAL-TRAP.—John Coombe, assignor to himself and Henry Phelps, San José, Cal.

123,382.—MACHINE FOR SCREWING PIPES TOGETHER.—Richard T. Crane, Chicago, Ill.

123,383.—PROPELLING BOATS.—Charles Dancker, Hoboken, N. J.

123,384.—SOFTENING FROZEN GROUND FOR EXCAVATING.—Andrew Derrom, Paterson, N. J.

123,385.—COMPOUND BUILDING BLOCK.—Andrew Derrom, Paterson, N. J.

123,386.—COMBINED KNIFE AND FORK CLEANER, KNIFE-SHARPENER, AND CAN-OPENER.—Frederick W. Echternach and Milton J. Welch, Philadelphia, Pa.

123,387.—GRAIN-SEPARATOR.—Joseph Esse, Redwood City, Cal.

123,388.—TURBINE-MOTOR GATE.—John T. Fanning, Norwich, Conn.

123,389.—LETTER-SHEET ENVELOPE.—Charles Foster, assignor of one-half his right to Charles W. Kinne, Cortland Village, N. Y.

123,390.—BEER AND WATER COOLER.—Charles Geenen, New Orleans, La.

123,391.—ELEVATOR.—Paul Giffhorn, Akron, Ohio.

123,392.—SHINGLE MACHINE.—Henry L. Gooch, East Machias, Maine.

123,393.—PRESSER-FOOT FOR SEWING-MACHINES.—Harry C. Goodrich, Chicago, Ill.

123,394.—GRAIN-DRILL.—Benjamin W. Gould, Winterset, Iowa.

123,395.—TRACTION ENGINE.—John Greenslade, Steeple-near-Maldon, England.

123,396.—ELLIPTIC SPRING FOR VEHICLES.—Richard Halloran, New York City. Ante-dated Jan. 31, 1872.

123,397.—EXTENSION-TABLE.—August Hanson, San Francisco, Cal.

123,398.—PULL FOR DRAWERS, ETC.—Hermann Herlt, New York City.

123,399.—MOWING MACHINE.—William Heston, Bedford, Ohio.

123,400.—BRICK MACHINE.—Henry Jones, Fort Madison, Iowa.

123,401.—HAMES FOR HARNESS.—Richard W. Jones, assignor to himself and Hiram R. Olmstead, Syracuse, N. Y.

123,402.—FLOATING DOCK.—Stanislas Janicki, St. Petersburg, Russia.

123,403.—DOUGH-MIXER.—Reuben Kent, Portland, Maine.

123,404.—HORSESHOE.—Thomas Kinghorn and Robert Kinghorn, Morgan, Ohio.

123,405.—SHOE-FASTENER.—Alexander Klinger, California, Mo.

123,406.—ORE AND STONE-CRUSHER.—Robert Learmouth, Buffalo, N. Y.

123,407.—PUNCHING MACHINE.—John M. Long, Hamilton, Ohio.

123,408.—CHILDREN'S CARRIAGE.—Charles Gottlob Macht, New York City.

123,409.—SPRING-BOTTOM VEHICLE.—Joshua S. Merrill, Titusville, Pa.

123,410.—CULTIVATOR.—John R. Minter, Unionville, S. C.

123,411.—SELF-ACTING GATE.—Isaac B. Mishler, Breathedsville, Md.

123,412.—FOLDING CHAIR.—George F. Mitchell and Albert A. Sheafe, South Boston, Mass.

123,413.—PULLEY AND WHEEL-FASTENER.—Augustus Newell, Chicago, Ill.

123,414.—STEAM-BOILER.—Ezra Nicholson, assignor of two-thirds his right to Charles B. Stillwell and John J. Clause, Cleveland, Ohio.

123,415.—LAMP.—Joseph M. Parker, La Grange, Mo.

123,416.—HORSE-POWER.—Samuel Pelton, Marysville, Cal.

123,417.—HINGED JOINT FOR CAR-SEATS.—George W. Perry, New Castle, Del.

123,418.—APPARATUS FOR EXHAUSTING AIR FROM PRESERVE-CANS.—David N. Phelps, San Leandro, Cal.

123,419.—COOKING-STOVE.—John A. Price, Scranton, Pa.

123,420.—SPARK-ARRESTER.—Herman F. Reiner, Blairsville, Pa.

123,421.—BUNG.—Daniel B. Rickey, San Francisco, Cal.

123,422.—BUREAU.—Herman Rocke, New York City.

123,423.—MANUFACTURE OF ALCOHOLIC SPIRITS.—Ianthis J. Rolfe and Josiah Rogers, Nevada City, Cal.

123,424.—BIN FOR STORING AND DRYING GRAIN.—Jarvis Royal, White Rock, Ill.

123,425.—CLOTH-PLAITING MACHINE.—Joseph A. Sawyer, Worcester, Mass.

123,426.—WASHING MACHINE.—Henry S. See, Evansburg, Pa.

123,427.—BOILER FURNACE.—William C. Smith, New Brunswick, N. J.

123,428.—CORN-HUSKER.—Peter B. Snell, Manheim, N. Y.

123,429.—PEDAL ATTACHMENT FOR PIANOS.—Nathaniel A. Stimson, Herkimer, N. Y.

123,430.—END-GATE FOR WAGONS.—Samuel G. Thomas, Eden, Ill.

123,431.—WASHING MACHINE.—Martin Way and Frank Way, Springfield, Ohio.

123,432.—WRINGING MACHINE.—Martin Way and Frank Way, Springfield, Ohio.

123,433.—FILE-GRIPING HANDLE.—Alfred Weed, Boston, Mass.

123,434.—DISH-WASHING MACHINE.—Catharine Woodruff, Antioch, Cal.

123,435.—MACHINE FOR PUNCHING METALS.—Gaspar Zender, Caledonia, Minn.

123,436.—SAFETY-VALVE FOR STEAM-ENGINES.—Henry W. Adams, Philadelphia, Pa.

123,437.—STEAM BOILER.—Henry W. Adams, Philadelphia, Pa.

123,438.—MAGNETO-ELECTRIC MACHINE.—Almon N. Allen, Pittsfield, Mass.

123,439.—LIGHTING GAS BY MEANS OF ELECTRICITY, ETC.—Almon N. Allen, Pittsfield, Mass.

123,440.—DUMPING-WAGON.—Joseph F. Applegate, New Albany, Ind.

123,441.—TELEGRAPHY.—William C. Barney, Washington, assignor to Franklin Steele, Georgetown, D. C.

123,442.—BALL-GAME.—Edward A. Barrett, New York City.

123,443.—MANUFACTURE OF STEEL.—Julius Baur, Brooklyn (E. D.), N. Y.

123,444.—LOCK.—George Bayer, New York City.

123,445.—WOOD PAVEMENT.—George A. Beidler, Philadelphia, Pa.

123,446.—MANUFACTURE OF FLOUR.—Lemuel G. Binkly, Baughman, Ohio.

123,447.—GATE.—Richard A. Boulware, Doniphan, Kan.

123,448.—WATER-WHEEL.—Charles E. Brooks, assignor of two-thirds of his right to Charles S. Crane and Parker B. Hamilton, Marshall, Mich.

123,449.—ELECTRO-MAGNETIC RAILWAY-SIGNAL AND SWITCH-TENDER.—Hugh S. L. Bryan, Liberty, Mo. Ante-dated Jan. 25, 1872.

123,450.—MODE OF FINISHING THE SOLES OF BOOTS AND SHOES.—Bradley S. Bryant, Hanson, Mass.

123,451.—DENTAL PLATE AND TEETH.—Robert E. Burlan, Lewisburg, Pa.

123,452.—HYDROCARBON-BURNING STEAM BOILER.—Albert G. Buzby, Philadelphia, Pa.

123,453.—MILK-SAFE.—James W. Case, Ypsilanti, Mich.

123,454.—PROCESS OF VULCANIZING RUBBER HOSE.—John H. Cheever, New York City.

123,455.—STEAM-PRESSURE ALARM.—Jonathan Cone, Bristol, Pa.

123,456.—BLACKBOARD.—Marcellus F. Cowdery, Sandusky, Ohio.

123,457.—BLACKBOARD.—Marcellus F. Cowdery, Sandusky, Ohio.

123,458.—ASPHALT PAVEMENT.—Andrew J. Crawford, Brooklyn, N. Y.

123,459.—CART-SADDLE.—Courtland C. Cushman, assignor of one-half his right to George E. White, Gallipolis, Ohio.

123,460.—FOUNTAIN-PEN.—Thomas M. Davis, assignor to himself, Lemuel O. Kessler, and Wm. P. Corney, Philadelphia, Pa.

123,461.—MANUFACTURE OF ZINC FROM THE DROSS IN GALVANIZING IRON.—Leonce de Metz, Elizabeth, N. J. Ante-dated Feb. 3, 1872.

123,462.—PENCIL-SHARPENER.—Henry L. De Zeng, Geneva, N. Y.

123,463.—COUNTERSINK AND PLUG-BORER.—Wallace H. Dodge, Mishawaka, Ind.

123,464.—UNIVERSAL SHAFT-COUPLING.—Wilfred P. Dugdale, Goshen, Ind.

123,465.—BEER-COOLER.—Hermann Ellerbrock and Christian Mahier, Baltimore, Md.

123,466.—SAW.—James E. Emerson, Trenton, N. J.

123,467.—PRESERVING WOOD.—Lewis Feuchtwanger, New York City, assignor to H. G. Fant, C. C. Gidoon, and W. D. Colt, Washington, D. C.

123,468.—CARRIAGE-WHEEL.—Charles W. Fillmore, Marengo, Ill.

123,469.—CURRY-COMB.—Joshia Filson, Jr., Racine, Ohio.

123,470.—BEE-HIVE.—Samuel Fink, Lindsey, Ohio.

123,471.—LADIES' WAIST-BELT.—James M. Flagg, Providence, R. I.

123,472.—CARRIAGE-HUB.—Henry R. Fry, Wabash, Ind.

123,473.—APPARATUS FOR MANUFACTURING SOAP.—Edwin H. Gibbs, New York City.

123,474.—LAND MARKER.—Joseph V. Gray, Washington, Ind.

123,475.—WASHING MACHINE.—George W. Gregory, New York City.

123,476.—AUTOMATIC FAN.—Willis De Lancey Hall, Memphis, Tenn.

123,477.—ROTARY EDGE-KEY FOR POLISHING BOOTS AND SHOES.—Samuel H. Hodges, assignor to The Hodges Edge-Trimming and Setting Machine Association, Lynn, Mass.

123,478.—ROTARY CUTTER FOR SOLE-TRIMMING MACHINES.—Samuel H. Hodges, assignor to The Hodges Edge-Trimming and Setting Machine Association, Lynn, Mass.

123,479.—DITCHING AND TILE-LAYING MACHINE.—Marsena M. Hooton, Chicago, Ill. Ante-dated Jan. 22, 1872.

123,480.—HUB FOR WHEELS OF VEHICLES.—Ellsworth D. Ives, Philadelphia, Pa.

123,481.—COOKING STOVE.—Ross Johnson, Lawrence, Kan.

123,482.—RAILROAD SWITCH.—Chauncy F. Keller, Upper Sandusky, Ohio.

123,483.—COMB-FRAME FOR BEE-HIVES.—Wiley Kenyon, Crawfordsville, Ind.

123,484.—STEAM-BOILER ALARM.—Joseph Henry Killey and William John Killey, Hamilton, Canada.

123,485.—PENCIL-CASE.—John H. Knapp, New York City.

123,486.—PENCIL-CASE.—John H. Knapp, New York City.

123,487.—FENCE.—Israel L. Landis, Lancaster, Pa.

123,488.—FENCE.—Israel L. Landis, Lancaster, Pa.

123,489.—HOT-WATER RESERVOIR FOR STOVE-PIPES.—Charles Lauby, Brodhead, Wis.

123,490.—TELEGRAPH APPARATUS.—George Little, Rutherford Park, N. J.

123,491.—TELEGRAPH RECEIVING AND TRANSMITTING INSTRUMENT.—George Little, Rutherford Park, N. J.

123,492.—BOOT-CRIMPING MACHINE.—Cyrus Lomax and Hiram Lindley, Paoli, Ind.

123,493.—SEWING-MACHINE.—William A. Mack, Norwalk, Ohio. Ante-dated Jan. 22, 1872.

123,494.—GATHERING ATTACHMENT FOR SEWING-MACHINES.—William A. Mack, Norwalk, Conn. Ante-dated Jan. 22, 1872.

123,495.—CLOTHES-WRINGER.—John Makechney, Trenton, N. J.

123,496.—CAR-COUPLING.—Levin Marshall, Mount Sterling, Ill.

123,497.—SKINNING-KNIFE.—Armitt McCarraher, Sadisbury township, Pa. (Hugh Rambo, administrator). Ante-dated Jan. 17, 1872.

123,498.—LAMP-BRACKET.—Hiram W. McDonald, Bucyrus, Ohio.

123,499.—WHEEL-PLOW.—Mark A. Melvin, Washington Court House, Ohio.

123,500.—GOVERNOR CUT-OFF.—Herman H. Meyer, Denver, Col. Ter.

123,501.—CONSTRUCTION OF SIEVE.—Fred. J. Meyers, Covington, Ky.

123,502.—HOE.—John C. Miller, Danville, Conn.

123,503.—MANUFACTURE OF STEEL FOR CASTING IN GREEN-SAND MOLDS.—Jo n Millwood, Minerva, Ohio, assignor to James E. Atwood, Pittsburg, Pa. Ante-dated Jan. 22, 1872.

123,504.—CANAL PROPULSION.—John L. Nicolai, Chicago, Ill. Ante-dated Jan. 22, 1872.

123,505.—WHEEL-PLOW.—Charles N. Owen, Salem, Ohio.

123,506.—VAPOR-BURNER.—Robert W. Park, Philadelphia, Pa.

123,507.—HEAD-BLOCK.—Darius Parkhurst, St. Louis, Mo.

123,508.—HAIR-CLIPPING MACHINE.—George H. Pratt, Boston Highlands, Mass.

123,509.—OYSTER-BLOCK.—William Rankin, New York City.

123,510.—CAR-COUPLING.—Joseph Davis Riggs, Buckley, Ill.

123,511.—ROOFING.—George W. Robinson, Bennington, Vt.

123,512.—WASHING MACHINE.—Andrew J. Rogers, Churchville, Va.

123,513.—RAILROAD-CAR VENTILATOR.—Henry J. Ruttan, Cobourg, Canada.

123,514.—CORN-PLANTER AND MARKER.—Thomas Ryan, St. Martins, Ohio.

123,515.—STEAM-TRAP.—Charles Schmandt, Baltimore, Md.

123,516.—STREET-LAMP.—William G. Schmidlin and Jeremiah W. Driscoll, New York City.

123,517.—HAY PRESS.—John Scott, Brooklyn, N. Y.

123,518.—FIRE-PLACE.—Gardner R. Scriven, Hanging Rock, Ohio

123,519.—SHUTTER-FASTENER.—Thomas S. Seabury, St. James, N. Y.

123,520.—BED-BOTTOM.—Henry T. Smith, Washington, D. C.

123,521.—LIQUID METER.—William E. Snediker, assignor to José F. De Navarro, New York City.

123,522.—PHOTOGRAPHIC APPARATUS.—John Stock and Jacob Stock, New York City.

123,523.—HORSESHOE-STRETCHER.—Hugh Thompson, Philadelphia, Pa.

123,524.—SHAWL-STRAP AND TRAVELING-BAG HOLDER.—James S. Topham, Washington, D. C.

123,525.—SHAWL-STRAP AND TRAVELING-BAG HANDLE.—James S. Topham, Washington, D. C.

123,526.—RAILWAY-TIE AND CHAIR.—Lucius E. Towne, Brodhead, Wis.

123,527.—ELECTRICAL APPARATUS FOR PREVENTING RAILWAY ACCIDENTS.—Charles Verny and Adrian Veillet, Lille, France.

123,528.—FURNACE FOR ANNEALING PLOWSHARES, ETC.—William Medd Watson, Tonica, Ill.

123,529.—TUCKING DEVICE FOR SEWING-MACHINES.—John W. Wharton, Bourneville, Ohio, assignor of one-half his right to John W. Igou, Indianapolis, Ind.

123,530.—WATER METER.—Henry F. Wheeler, Boston, Mass.

123,531.—DOOR-LOCK.—Andrew F. Whiting, Bath, Maine.

123,532.—KEY FOR LOCKS.—Andrew F. Whiting, Bath, Maine.

123,533.—COMBINED LATCH AND KEY FOR SLIDING DOORS.—Andrew F. Whiting, Bath, Maine.

123,534.—STOP-COCK.—Asa W. Wilkinson, New York City.

123,535.—OXYHYDROGEN GAS-FIXTURE.—Asa W. Wilkinson, New York City.

123,536.—COMPOUND OXYHYDROGEN BURNER.—Asa W. Wilkinson, New York City.

123,537.—OXYHYDROGEN BURNER.—Asa W. Wilkinson, New York City.

123,538.—MANUFACTURE OF ILLUMINATING GAS.—Asa W. Wilkinson, New York City.

123,539.—CARBURETER.—Asa W. Wilkinson, New York City.

123,540.—APPLE-CORER AND SLICER.—Henry W. Williams, assignor of one-third his right to Ion G. Deiterich and Charles H. Hoover, Galesburg, Ill.

123,541.—CONDENSER FOR STEAM-ENGINES.—William Wright, New York City.

123,542.—STEAM SUPERHEATER.—Henry Yost, Columbia, Pa.

123,543.—APPARATUS FOR SHIFTING BELTS ON PULLEYS.—Peter J. Zier, Pittsburg, Pa.

123,544.—PACKAGE FOR CUSTIC ALKALIES, ACIDS, AND SALTS.—Jacob H. Seibert, Philadelphia, Pa.

RE-ISSUES.

4,731.—BOILER FURNACE FOR BURNING WET FUEL.—Gideon Bantz, Frederick, Md. Patent No. 20,616, dated June 22, 1858.

4,732.—STEAM-ACTUATED CAR-BRAKE.—John T. Bassett, assignor to himself, John Bassler, and Marcellus S. Matthews, Galesburg, Ill. Patent No. 119,913, dated Oct. 17, 1871.

4,733.—TOBACCO-PIPE.—Henry G. Dayton, Maysville, Ky., assignor to Richard H. Collins, Cincinnati, Ohio. Patent No. 77,803, dated May 12, 1868.

4,734.—SEAL-LOCK FOR RAILWAY-CARS.—John H. Lyon, New York City. Patent No. 29,181, dated July 17, 1860.

4,735.—CONSTRUCTION OF FRUIT-CANS.—John F. Merrill, Cincinnati, Ohio. Patent No. 105,109, dated July 5, 1870.

4,736.—DEVICE FOR HOLDING BITS AND OTHER TOOLS.—Miller's Falls Manufacturing Company, assignees, by mesne-assignments, of William H. Barber, deceased, Miller's Falls, Mass. Patent No. 42,827, dated May 24, 1864.

4,737.—PLANING MACHINE.—James J. Russ, assignor to R. Ball & Co., Worcester, Mass. Patent No. 75,984, dated March 24, 1868.

4,738.—PLANING MACHINE.—Henry B. Schenck, William T. Y. Schenck, and Adelaide L. Schenck, assignees, by mesne-assignments, of John B. Schenck, deceased, Matteawan, N. Y. Patent No. 84,460, dated Feb. 2, 1869.

4,739.—GRINDING MILL.—(Div. A.)—Nelson Burr, Batavia, Ill. Patent No. 94,072, dated Aug. 24, 1869.

4,740.—GRINDING MILL.—(Div. B.)—Nelson Burr, Batavia, Ill. Patent No. 94,072, dated Aug. 24, 1869.

4,741.—GRINDING MILL.—(Div. A.)—Nelson Burr, Batavia, Ill. Patent No. 29,462, dated Aug. 7, 1860.

4,742.—GRINDING MILL.—(Div. B.)—Nelson Burr, Batavia, Ill. Patent No. 29,462, dated Aug. 7, 1860.

4,743.—BURNING HYDROCARBON.—Joseph K. Caldwell, assignor of part interest to Albert L. Murphy, Thomas M. Coane, Joseph N. Withers, and Thomas Caldwell, Philadelphia, Pa. Patent No. 118,903, dated Sept. 12, 1871.

4,744.—APPARATUS FOR HEATING BUILDINGS BY STEAM.—Samuel F. Gold, assignor, by mesne-assignments, to the Union Steam and Water Heating Company, Englewood, N. J. Patent No. 24,456, dated June 21, 1869.

4,745.—HEAD-BLOCK.—Dennis Lane, Montpelier, Vt. Patent No. 32,774, dated July 9, 1861; re-issue No. 2,872, dated Feb. 18, 1868.

4,746.—DYEING AND PRINTING TEXTILE FABRICS AND YARNS WITH ANILINE BLACK.—(Div. A.)—John Lightfoot, assignor to J. J. Müller Pack, Burnley, England. Patent No. 38,589, dated May 19, 1863.

4,747.—FABRIC DYED WITH ANILINE BLACK.—(Div. B.)—John Lightfoot, assignor to J. J. Müller Pack, Burnley, England. Patent No. 38,589, dated May 19, 1863.

4,748.—FASTENING FOR OVERSHOES.—Helen Ekin Starrett, Lawrence, Kan. Patent No. 100,207, dated Feb. 22, 1870.

DESIGNS.

5,505.—PRINTED FABRIC.—Frazer Christie, assignor to Coffin & Altemus, Philadelphia, Pa.

5,506.—SHAWL.—Hermann Erbs, assignor to himself and John Barth, Philadelphia, Pa.

5,507.—TYPE.—Andrew Gilbert, Boston, Mass.

5,508.—LEECH-JAR.—William Neidlinger, New York City.

5,509.—SODA-FOUNTAIN.—George F. Meacham, Newton, assignor to James W. Tufts, Medford, Mass.

TRADE-MARKS.

644.—ALPACA-FINISHED UMBRELLAS.—Dawes & and Fanning, New York City.

645 to 647.—FERTILIZERS.—Maryland Fertilizing and Manufacturing Company, Baltimore, Md.

648.—SOAP.—Jesse Oakley, New York City.

649 to 651.—WHISKY.—James M. O'Donnell, Staten Island, N. Y.

652.—WHISKY.—Charles H. Ross & Co., Baltimore, Md.

EXTENSIONS.

18,871.—HARVESTER.—Thomas I. Stealey. Dec. 15, 1857; reissued Nov. 6, 1866, and again Feb. 12, 1867, to Robert T. Campbell, assignee.

19,206.—HYDRANT.—Washburn Race and S. R. C. Matthews. Jan. 26, 1858; re-issued to said S. R. C. Matthews, as assignee, July 18, 1871.

19,191.—MAKING BLADES FOR PENCIL-SHARPENERS.—Walter K. Foster, Jan. 26, 1858.

19,222.—SEED-PLANTER.—James D. Willoughby. Jan. 26, 1858.

APPLICATIONS FOR EXTENSIONS.

OPPONENTS of extensions must file *written* objections in the Patent Office at least 20 days before the day-of-hearing; and on the Patent Office, and state the reasons of their opposition. All testimony—*pro* or *con*—must be taken and transmitted in accordance with the official rules, which will be furnished on application. The under-named patentees have recently petitioned for extensions (for seven years) of patents granted to them in the year 1858:—

WILLIAM RILEY, Madison County, Miss.—*Fly Trap.*—Patented April 27, 1858; testimony will close on March 26, next; last day for filing arguments and examiner's report, April 5; day-of-hearing, April 10.

LEWIS MILLER, Canton, Ohio.—*Harvester.*—Patented May 4, 1858; testimony will close on April 2, next; last day for filing arguments and examiner's report, April 12; day-of-hearing, April 17.

LEWIS MILLER, Canton, Ohio.—*Harvester.*—Patented May 4, 1858; re-issued July 19, 1859; testimony will close on April 2, next; last day for filing arguments and examiner's report, April 12; day-of-hearing, April 17.

WILLIAM S. CARR, New York City.—*Water-closet.*—Patented May 4, 1858; testimony will close on April 3, next; last day for filing arguments and examiner's report April 12; day-of-hearing, April 17.

DANIEL BARNUM, Brooklyn, N. Y.—*Steam-engine.*—Patented May 4, 1858; testimony will close on April 2, next; last day for filing arguments and examiner's report, April 12; day-of-hearing, April 17.

LEMUEL W. SERRELL, Plainfield, N. J.—*Guide for Sewing-machines.*—Patented May 11, 1858; testimony will close on April 9, next; last day for filing arguments and examiner's report, April 19; day-of-hearing, April 24.

LEWIS MILLER, Akron, Ohio.—*Finger Guard for Harvester.* Patented May 11, 1858; testimony will close on April 9, next; last day for filing arguments and examiner's report, April 19; day-of-hearing, April 24.

MARSHALL JEWELL, Hartford, Conn.—*Manufacture of Round Belting.*—Patented June 15, 1858; testimony will close on May 14, next; last day for filing arguments and examiner's report, May 24; day-of-hearing, May 29.

J. R. HALL, Salem, Ohio.—*Shingle Machine.*—Patented June 22, 1858; testimony will close on May 21, next; last day for filing arguments and examiner's report, May 31; day-of-hearing, June 5.

LOUIS MILLER, Canton, Ohio.—*Harvester.*—Patented May 4, 1858; re-issued July 19, 1859; testimony will close on April 2, next; last day for filing arguments and examiner's report, April 12; day-of-hearing, April 17.

Letter Box

A. E., OF N. Y.—The following is the formula for determining the velocity of discharge of water through a pipe in feet per second:—"Multiply 2,500 times diameter in feet by height in feet, divide by length of feet, added to fifty times the diameter. The square root of the quotient is the diameter in feet per second."

STOKER, OF IND.—A fair charge for your gas-retort would be about one hundred and twenty pounds. Charge every four hours. Take care to fire up the bench gradually, as an irregular heat will injure the retort.

E. F. J., OF OHIO.—A gilder's knife is simply a long, flexible blade, used for cutting the gold-leaf upon the "cushion" preparatory to laying it upon the work. Its edge must be straight and smooth, and must be kept very clean, or it will crumble and tear the leaf instead of cutting it.

L. R., OF N. J.—You are in error. It has been found that when a T-beam is placed with the rib uppermost, the breaking strength is nearly four times as great as when this position is reversed.

EXPERIMENTER, OF CONN.—Papin's digester comprised a vertical cylindrical vessel with a furnace underneath. The cover on top was held down by a screw working through a nut in a yoke attached to the sides of the vessel. The cover was furnished with a lever safety-valve, the first ever used. It is said that by the aid of this digester, within only a few years past, gelatine has been extracted from fossil bones, and used for alimentary purposes.

G. W., OF PA.—To transfer the design from your panel to paper, first make a tracing paper by saturating transparent paper with linseed-oil. Wipe the surface of the paper, and then trace the design with a soft pencil. This done, reverse the tracing with its penciled side upon clean dry paper, and then press the lined portions firmly, either with a pencil point or stylus. By this means the design will be transferred from the tracing to the paper.

M. P., OF R. I.—The idea of procuring fire by suddenly compressing air upon a piece of tinder is far from new. Many years ago, an English inventor proposed to fire cannon and other firearms by this means. But your apparatus is novel in construction, and you could probably sustain a claim upon the arrangement of its parts. You must be your own judge of its probable value as a means of money making.

L. N., OF MO.—We have no doubt of the immense mineral resources of your State, or of the truthfulness of your assertions concerning the probable profits of iron and other manufactures there. But the enterprise you propose is wholly out of our line. We shall be pleased to examine your invention, and give an opinion as to its patentability, without charge, if you will send us a pencil sketch and full description.

F. R., OF N. Y.—Theoretically, a unit of heat should evaporate the same quantity of liquid from the larger vessel as from the smaller; but practically the evaporation might be lessened in the larger vessel owing to the greater loss by radiation and convection.

J. K., OF MO.—Your iron ore was probably a hematite, which dissolves with difficulty in hydrochloric acid. There is a method of overcoming this by preliminary reduction to the metallic state, by heating to redness in an atmosphere of hydrogen and coal gas.

B. R., OF DEL.—Your tobacco-seed planter is new to us, and we think patentable. It seems, however, that the devices are not capable of being made to work with sufficient accuracy for the purpose required, although the machine would be suitable for sowing larger kinds of seed. For this last it is doubtless well worth the cost of patenting, and of introducing to the market.

Glass from Granite.

THE *Baltic Journal* reports that there exists near several cities of Finland a kind of granite, called there *cupakivi*, of which the composition is this:—Silica, 74 per cent.; feldspar, 12; oxyd of iron, 3; lime, 1; alkalies, with traces of magnesia, 9. This being evidently a good compound to make glass, the first experiment was consequently made by melting 500 parts granite and 200 limestone, and a white glass was obtained. The second experiment was made with 500 granite, 150 lime, and 75 of soda. This glass was more fusible, and at the same time harder. Both kinds were blown without difficulty, at a bright-red heat, while a dark glass was made by the addition of 70 parts of sulphate of lime or potash and 7 parts of carbon.

ARONSON'S PATENT STREET LAMP.

THE invention illustrated in the accompanying engravings consists in the construction of street or other lamps or lanterns with sides constituted by glass panels, shaped in such wise as to present a series of lenses for refracting the light in the direction required to insure the most economical diffusion of light with a flame of given intensity. Another feature comprises a novel method of se-

curing the glass panels in place without the aid of upright frames, rods, or similar devices commonly adopted for such purpose. Fig. 1 is a perspective view of a street lamp constructed according to the invention; and Fig. 2 is a detached view of one of the glass panels forming the sides thereof.

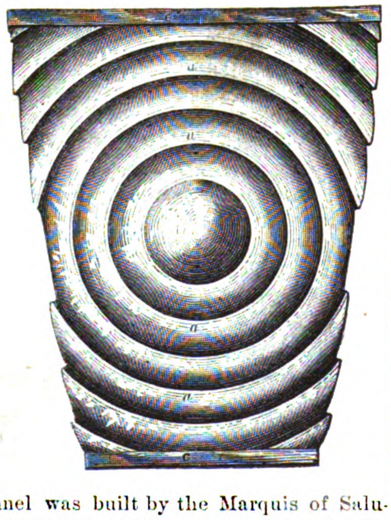
The panes or panels, A, constituting the sides of the lamp are made of cast or pressed glass, with their outer surfaces presenting a series of concentric bosses, *a*, in the form of lenses, and having tongues, *c*, *c'*, extending externally along their upper and lower edges, these panels having their general form flat. But they may, when desired, be made concavo-convex or of other curved contour. Their lateral edges are beveled or mitered to fit closely together without the interposition of any metallic framing.

B is a grooved metallic band surrounding the lower edges of the panes, A, and receiving within its grooves the tongues, *c*. B' is a grooved metal band surrounding the upper edges of the panels, and receiving within its grooves the tongue, *c'*. These bands are made of tin plate or equivalent material suitably shaped to provide the requisite grooves for receiving the tongues, and for holding the same firmly to secure the panels rigidly together at their side edges, these of course uniting to form the corners of the lamp. They also provide against any accidental vertical displacement of the panels, thereby dispensing with rods or other devices which would obstruct the light. The band, B, may constitute the base of the lamp, and the other band, B', may support the head or upper portion of the lamp, constructed in any usual or appropriate manner. The same general construction may be adopted in lanterns as well as for street and other lamps. This improvement was patented through the "American Artisan Patent Agency," May 9, 1871, and is the invention of Mr. Joseph N. Aronson, of New York City.

The Mont Viso Tunnel.

THE Mont Cenis tunnel is not the first one through the Alps. More than three hundred years

Fig. 2

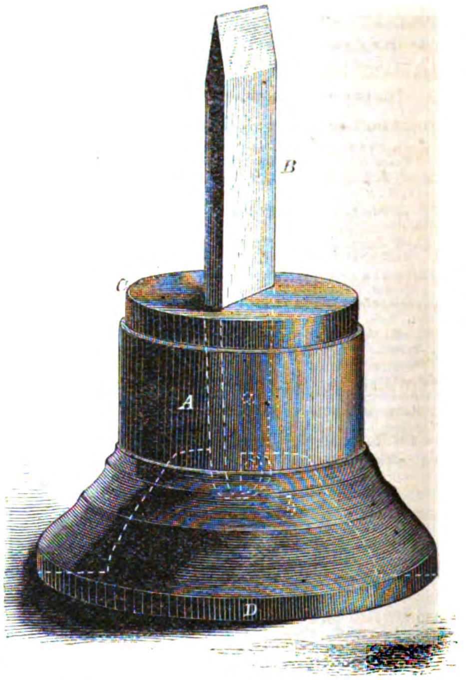


ago a tunnel was built by the Marquis of Saluces, through the Mont Viso, at whose foot the Po rises. It is about one-sixth as long as the Mont Cenis tunnel, and, considering the difference in the methods and implements in use, it was quite as bold an undertaking. It opens on the Italian side at the very source of the Po, about 2,000 yards above the level of the sea, and more than 2,150 yards of its length is cut in a straight line through the solid rock in the very heart of the Alpine chain. It was intended to be used as a turnpike road, and it is to this day the only direct route from Embrun to Saluces. Partly destroyed by the King of Sardinia, so as to impede the invasion of the French republican armies, it was afterwards repaired and improved by Napoleon I. Strange that such a work should have been forgotten, and should now be of no practical use.—*N. Y. Post.*

RANKIN'S IMPROVED OYSTER BLOCK.

WHEN the immense number of oysters annually consumed is taken into consideration, the practical utility of any device which facilitates their preparation for consumption will be apparent. Such a device is represented in the oyster block illustrated in the accompanying engraving. It is the invention of Mr. William Rankin, of 110 Ninth Avenue, New York City, by whom, through the "American Artisan Patent Agency," it was patented Feb. 6, 1872.

The block, B, upon which the oysters rest while being struck with the knife in opening, has its lower end formed into a tapering shank, which fits into and extends through a socket of corre-



sponding shape in the base, A, of cast-iron. The under side of this base has a cavity formed in it, and the extremity of the shank of the block, extending into this cavity, is furnished with a transverse key, *c*, which holds it firmly in position. The base, A, is enlarged at its lower part to insure stability, and has at bottom a thickness, D, of india-rubber, which from its peculiarly adhesive surface prevents the block from slipping upon the surface on which it is placed. Upon the upper side of the base, and around the block, B, is another layer, C, of india-rubber, the office of which is to receive the stroke of the knife in case of the accidental slipping of the latter, thereby preventing any injury thereto. Not only are the advantages just above indicated secured in this device, but the additional and important one, that the splitting incident to the ordinary wooden base is wholly obviated by the employment of cast-iron in the construction of the same, as explained.

FRENCH silver lac consists of very finely divided tin precipitated from its solution by means of zinc. Applied by means of some adhesive substance to wood, paper, and metals, it communicates to them a metallic silvery appearance.

AMERICAN ARTISAN

BROWN, COOMBS & CO., Publishers.
ISSUED WEEKLY AT
No 189 Broadway, New York.
H. T. BROWN. J. W. COOMBS.

AGENTS.

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WEDNESDAY, FEBRUARY 14, 1872.

CALORIC ENGINES FOR STREET-CARS.

MR. W. BRIDGES ADAMS, an English engineer, has lately read a paper before the London Society of Arts, in which he advocates a use of the caloric engine to which even the most sanguine of its American partisans would hesitate to pin their faith. He says that "there would be no difficulty in constructing a hot-air locomotive, weighing not more than three tuns, to develop a traction force of six hundred pounds at the rails, a force ample for the purpose of drawing a load of six hundred passengers through the streets of London." In other words, a caloric motor would, according to this plan, be substituted for the steam-motor on a "dummy," the avoidance of the weight of the boiler being assumed as counterbalancing the greater weight of the caloric as compared with the steam engine.

It may be gratifying, on the supposition that blunderers, like those in misery, appreciate company, to find that all the crudeness of invention shown concerning the subject of tramway transit is not indigenous to this country. But whether speculations like those above referred to are capable of bringing to pass any useful result is doubtful. Even assuming that the same power in proportion to the weight could be obtained with a caloric engine as with a steam-engine, its greater bulk would prove a sufficient objection to its use. If such a locomotive were to be used in lieu of an ordinary one for drawing trains of cars, which it would have to do to draw six hundred passengers, it is difficult to conceive wherein—as concerns noise, escaping products of combustion, and the like—it would be in any way better than steam; whereas, if the engine were combined direct with the car, the annoyance from heat, dust, etc., could be just as easily avoided, if such were possible at all, with one as with the other. The answer to the question of power propulsion for street-cars in lieu of horses, abroad as here, lies in the production of means whereby the power of stationary steam-engines can be transferred to some medium that shall yield it up as occasion requires to the driving-axle of the car. For this there are many projects, not one worked out in logical fashion to prove even the theory of its operation, but most of them offering in their further improvement, now that success in street-car propulsion is imperatively demanded by the times, greater rewards than could be looked for in the past by those whose inventive genius originated them.

MORE RAILWAY DISASTERS.

A CASUALTY, by which nine passengers lost their lives and a number of others were injured, occurred about fourteen miles from Mauch Chunk, near Wild Run, on the Lehigh Valley Railroad, on the morning of Feb. 1. A broken rail made a gap in the track, over which the locomotive and baggage-cars passed safely, but the two passenger-cars were thrown off down the embankment a distance of forty feet. The red-hot stoves, it is reported, set the wrecked cars in a blaze, as is very commonly the case in such disasters.

On the day previous to the above, four cars of a train, on the Philadelphia and Erie Railway, were thrown from the track near Lock Haven, Pa. In this case, also, the disaster is attributed to a broken rail, and, as in the other, a stove set the rubbish on fire. Twenty-six persons were seriously hurt, and one other so dangerously that at latest accounts life was despaired of.

A third broken rail, three miles from Batavia, N. Y., on the Batavia and Attica Railroad, Jan. 31, threw a locomotive from the track and smashed it beyond help by repair. But this was a small affair, no persons being hurt much, although the engineer and fireman had a narrow escape with their lives in jumping from the engine.

We say nothing of the suspicious iteration of "broken rail" with which these several items are reported, and to which the recent cold snap gives a certain plausibility, there being doubtless some reason in the common belief that steel and iron become more brittle in frosty weather, the recent dictum of certain philosophers to the contrary notwithstanding. Assuming that the reports are correct, is there no system of testing rails which shall prove them against the conditions to which, in our climate, they must necessarily be subjected during one-third of the year? If there is, it is the duty of rail manufacturers, and of rail buyers as well, to adopt it. If there is not, it is high time there was, and it is the business of projectors to provide it.

But the burning of the wrecked stoves by the red-hot metal of the stove, or the contact of its flaming coal, calls for severer condemnation. As surely as a common car-stove is upset, just so surely does it ignite the woody tinder of which our cars are made. Some day railway companies will be driven to the use of iron passenger-cars that will not burn. But, long before this is likely to come to pass, travelers must not as a custom be exposed to the hazard of being burned alive. There are a score of contrivances for heating cars, any one of which affords greater security than the ordinary stove, and it is high time that managers of railway lines were forced into the adoption of one or another of them.

A NOTABLE PROJECT.

ACCORDING to the Philadelphia *Press*, an enterprise of considerable importance has just been set on foot between the managing trustee of the Marquis of Bute and the managers of the Pennsylvania Railway. The object of this is to open almost direct communication between the great grain-growing regions of our Western States and the immense iron-producing districts of South Wales, Great Britain. Seven millions of dollars, it is said, have been expended in building docks at Cardiff, from which lines of steamers traverse the ocean to the ports of different countries, and between which and Jersey City, N. J., a new line is, in accordance with the new arrangement, to be started. These steamers will be of twenty-five hundred tuns burden. It is not, moreover, solely with a view to accommodate the grain trade that this scheme is undertaken. As is well known, the smelting of ore is carried on with greater economy at Swansea, in Wales, than in any of the smelting establishments of this country, hundreds of tuns being shipped monthly thereto from the mines of the great basin. The new steamship line will afford great facilities for the transport of the ores of Utah, Colorado, Nevada, etc., should it be conducted with a fair reference to the interests of the American railway lines with which it must connect.

PROTECTION OF WATER-PIPES IN MINES.

IN our visit to the mines of the Comstock Lode we found complaint of the manner in which iron water-pipes gave out under the biting touch of the vitriolic impurities of the moisture distilled from the crevices of the rock. Galvanizing or coating with zinc gave practically no protection from corrosion, and indeed no available remedy was known. The same difficulty appears to be experienced in the mines in many parts of Europe; and in those of Siberia, where pyrites are common, the trouble is said to be now very effectually avoided by a novel method of enameling the internal surface of the pipes. The process involves a preliminary exposure of three hours to a bath of oil of vitriol—sulphuric acid. After this they are washed with water, and are brushed with a composition composed of thirty-four parts silica, fifteen of borax, and two of soda, and are then placed in a retort at a dull-red heat for about ten minutes. This is the first coating. A second is laid on, composed of thirty-four parts of feldspar, nineteen of silica, twenty-four of borax, sixteen of tin oxyd, four of fluorspar, nine of soda, and three of niter. This is melted to a mass in a crucible, then ground to a fine paste with water, and in this condition applied to the pipe, which done the pipe is heated to a white heat, and maintained thereat for twenty minutes. This insures the perfect fixing of the enamel. Before the pipe has become wholly cool it receives an external application of coal-tar, and is then ready for use. There seems no good reason why pipe treated in this manner should not prove well adapted for purposes for which, owing to its inability to corrosion, ordinary iron pipe is inadmissible.

NEW PETROLEUM FURNACE.

IT is not likely that we shall have done with novelties in the line of petroleum furnaces until this fuel shall be adapted to many of the minor operations of metallurgy and steam-power practice. But in these the advantageous results will arise rather from the superior compactness, manageability, and obtainable intensity of heat incident to such furnaces than from the greater cheapness which the relatively higher calorific power of the fuel led many at the outset to think feasible. There are wanting data by which the comparative utility of the various systems proposed can be even approximately estimated. Among these are furnaces in which the fuel is vaporized before being admitted to the furnace, and, if we add the regenerator to save waste heat, we have simply the principle of the Siemens furnace with liquid fuel, and perhaps this, for many purposes, would give the best results. But a more simple and cheaper apparatus is the popular *sine qua non* in the profitable consumption of liquid hydrocarbons; and whether the passage by capillary attraction of the liquid up to the surface of a porous bed of sand or artificial stone, its flow in thin sheets over the surface of nearly hor-

izontal grate-bars, or its injection in a fine mist to the fire-pot, will afford the most usefulness, is undetermined, and, without more careful, extended, and costly experiments than we are likely very soon to have, the question will remain unanswered. In the meantime, it is well to note the occasional modifications made in this class of apparatus; modifications which in some instances may be justly assumed to be improvements, and tending each, as one step forward, to secure practically the profitable employment of liquid fuel, even if they do not, in themselves, prove free from defects. Among the most recent of these is a furnace lately set up in the School of the Sorbonne in Paris, which requires no blast, is specially adapted for use in the laboratory, and affords temperatures very difficult to obtain with solid fuel. The oil drops from the nozzles of a series of branching pipes upon a grooved and nearly vertical grate, between the bars of which is furnished the requisite supply of air. The bars being heated by the flame cause the fuel to be rapidly vaporized, and in this form it combines most readily with the oxygen of the air, and gives an intense flame of great length. Any oil that fails of combustion from the grate-bars, as just indicated, drips into a hot receiver at the bottom of the furnace, and, more slowly vaporized, mingles its gases with those rapidly generated above, and is thus consumed. In lighting the furnace, it is necessary to first fill it with straw or shavings saturated with oil, the combustion of which heats the grate-bars to a temperature sufficient to volatilize the oil as it drops from the nozzles to the grate. There seems to be but slight variation between this and some other apparatus for the purpose, but we are not disposed to deny that the changes, slight as they are, may be productive of decided advantages. The plan seems a good one, and, with suitable devices for automatically adjusting the flow of oil to the intensity of combustion to obtain perfect uniformity at any desired temperature, and with a vertical flue boiler so arranged that the lengthy tongues of flame would be brought into the most intimate contact with the heating surface, the method might perhaps be well employed in the solution of the vexed question of a cheap motor for household and small workshop use.

How Checkermen are Made.

THE Albany (N. Y.) Embossing Company cater to innocent amusement in the form of dominoes and checkers, and to infantile education in the shape of wooden blocks, with the letters in capitals on one side and in italics on the other. All are made by machinery, and many ingenious contrivances are employed for the sake of economy and for saving time and labor. After being thoroughly dried, the wood from which they are made is sawed into square or oblong-shaped bars, according as it is required for alphabet blocks or dominoes. For checkers, the bars are rounded on a turning lathe. Twelve small circular saws, attached to a revolving bar of iron, cut up the bars into as many pieces as fast as they are placed in position, the pieces dropping into a basket below. These little square and rounded blocks are stamped by a self-feeding sleeve-die, which stamps both sides at once. The wood being stamped on the end of the grain, no splitting occurs, though the stamping perceptibly decreases the thickness of the blocks, making them very tough and hard. Dominoes are stamped in two ways. In one, the pips are indented by the pressure; in the other, they stand up, and are protected from the liability of being broken off by a narrow edging. The die stamps 150 checkers or dominoes, but only ninety of the alphabet blocks, which are two and one-quarter inches square, in a minute. After stamping, the checkers are colored red and black in equal quantities; the dominoes are stained through a dull black to imitate the ordinary bone; the letter blocks are simply varnished. The checkers and dominoes are thrown pell-mell into cylinders of open wire-work, which slowly revolve in hot-air chambers, heated up to 180°. The varnish on the alphabet blocks is dried by sticking the blocks on innumerable pins pointing from a revolving wooden frame, about six feet in diameter, in a room heated to an ordinary temperature. If dried in the same way as the dominoes, they would adhere to one another in masses, while the varnish would be blistered by the excessive heat. When dry, the pips of the indented dominoes are colored white by a machine which has just as many hollow tubes pointing downward as there are pips to be colored. These tubes are full of white pigment, and as they descend on the domino a drop falls from each tube and fills up the indented pips. This machine will thus color the pips of twelve gross of boxes of dominoes in a day, each box holding twenty-eight dominoes.—*N. Y. Times.*

Wire Drawing.

MESSRS. JOS. WOODS & SONS, of Warrington, have invented an apparatus for the manufacture of wire, whereby the cost of production is materially lessened. The machine is simple in construction, and its application is easily understood, even by non-practical wire-drawers. So far, it has been applied to iron and steel with great success, though the claim is a general one for all kinds of wire. The primary object of the invention is to draw wire through two or more holes at one and at the same time, instead of only through one hole or die, as hitherto has been the practice. The machine is made to operate in the following manner:—The wire to be drawn is placed on a disk or fuse free to revolve on its own axis; from this disk it is led through a draw-plate or die, round a pulley driven at required speed; thence through another plate of smaller size, and round a second pulley moving at an accelerated surface speed, and so on through a third or fourth die or plate, according to the requirements and nature of the material to be drawn, regard being had to the necessity of giving to each succeeding pulley a greater surface-speed than the one preceding it. The wire is finally coiled upon a block or winding drum after passing through the last die or plate.

By this process wire may be drawn at one operation from one stage of annealing to the next; and by practical men its advantages over the present system must be acknowledged in the great economy of time and labor. In drawing wire by the ordinary mode from No. 15 to No. 19 iron wire gauge, there are no less than four distinct operations; for each size, Nos. 16, 17, 18, and 19 respectively, the whole length of wire is coiled upon the receiving drum, moving at 70 or 80 revolutions per minute, and at the termination of each operation is carried back repeatedly to the disk, until it reaches its required size; whereas by this invention it is placed upon the disk but *once*, and, after passing through the four plates or dies, is finally received upon the block, moving at the same speed, in its finished state, being handled but *once* in the course of the operation. There are other advantages that this machine possesses over the present system, the amount of waste of material being considerably less, and the uniform heat generated by the friction of the wire passing directly from plate to plate, and thence to the receiving drum, contributes not a little to the excellent quality of the work.

The machine has an adjunct in the way of a self-feeding grease-box, which performs its functions as no manipulation could. The invention is simple and complete in design, and so conveniently constructed that, while one coil is in the act of being drawn, another is in preparation and ready to start by the time the former is finished; no more time being lost between each *piece* than is lost in the ordinary mode between each *size*.—*Mechanics' Magazine.*

Purification of Air.

DR. LETHEBY, "Medical Officer of Health for the City of London," has the following upon the ventilation of sewers and the purifying of air by the use of charcoal:—

"In the case of sewers, let them be ventilated as they may, either by open gratings in the street, or by connections with rain-water pipes, or the pillars of gas-lamps, or by tubes from the drains of every house, or by special shafts in the public streets, we have but to place a small box of wood charcoal in the course of the outlet draught, and the purification of the air will be complete. As far as we know, the strength and endurance of this power are almost unlimited, so that, when once the charcoal air-filter has been set up, it will last continuously for years. These suggestions were at once adopted by the Commissioners of Sewers, and the engineer, Mr. Haywood, was instructed to report on the practical means of putting them into operation. A large district of the city was therefore selected for the purpose, and Mr. Haywood designed the plan of giving efficacy to the experiment. The district comprised a space of about fifty-nine acres in the worst part of the city. It is bounded by Bishopsgate Street on the west, from Cornhill to Widegate Street; by Whitechapel on the east, from Middlesex Street to Somerset Street; and thence along the Minories and Leadenhall Street to Cornhill on the south. In this space there are about 14,000 inhabitants living in about 1,700 houses. The total length of sewers is about 25,587 feet, and along these there are 104 air-shafts, 265 gullies, 15 flushing-shafts, 4 tanks, and 26 side entrances. This district was selected for various reasons:—1. Because the sewers have but a slight fall and the currents in them are sluggish; 2. The area is densely populated and has more than an average proportion of poor in it; 3. The thoroughfares are mostly narrow, and are, therefore, disagreeably affected by the sewer gases which issue from the ventilators; 4. The district affords comparatively good means of isolation from the sewers. Each of the 104 air-shafts was provided with a charcoal ventilator, an iron box about 18 inches deep and 14 inches square, containing a movable frame of six trays or sieves, upon each of which a layer of wood charcoal, in pieces as large as filberts, was placed to the depth of 2 inches. The experiment was commenced in the month of July, 1860, and it has been successfully continued to the present time, for, to use the words of our conjoint report on the subject, 'the deodorizing power of the charcoal has been satisfactorily proved to be complete. Not only have there been no complaints from the public of stenches from the ventilating openings, but we have ascertained by actual observation that the odor of the sewer gases is not perceptible

when they have traversed the charcoal. This, indeed, might have been predicted from the extensive laboratory experiments and the other practical inquiries to which we have alluded.' Charcoal from the ventilators has been submitted to chemical examination by me after having been in action for from nine to twenty months, and when heated with water it yields abundance of alkaline nitrate, showing that some of the organic miasmata have undergone complete oxydation. But besides these compounds others are present in the charcoal—namely, peculiar alkaline salts, which indicate the fixation not only of ammonia, but also of other volatile nitrogenous bodies which are peculiar to animal decomposition. Our general conclusions from these experiments were thus expressed:—

"'That dry charcoal in the presence of atmospheric air is a powerful means of destroying the mephitic gases and vapors of sewers and house-drains; that the charcoal air-filters may be used with efficacy in the course of the air channels from the drains and closets of houses, as well as in the ventilation of the public sewers; that, in applying the charcoal, those contrivances should be used which offer the least resistance to the free passage of air through the charcoal; that the situation of the filter is best when the charcoal is protected from wet and from dirt, and is easily accessible; and that, from the ascertained efficacy of charcoal in destroying the dangerous emanations from sewers, the system may be generally applied with great advantage.'"

Punched vs. Drilled Rivet Holes.

THERE are two methods of forming rivet holes in boiler and other plates which are adopted in practice; these are, punching and drilling. A considerable difference of opinion exists among engineers as to the relative merits of these two methods, some holding that punched, and others that drilled, holes are the better. It requires but little consideration to show that the forming of such holes is an important point in practice. We shall therefore endeavor to solve the problem involved, and to demonstrate that the advantages and disadvantages of the two methods are not equally balanced, but that one possesses a decided superiority over the other. And we may state at the outset that our opinion is decidedly in favor of drilling, as forming better work, injuring the iron less, and consequently resulting in stronger joints and seams than punching. If we would wish to observe the results of punching on a large scale, we have only to examine some of the targets at Shoeburyness. The holes there range from nine inches to fifteen inches in diameter, and have been produced by very powerful machines, not driven by steam, but by gunpowder. This, it may be said, affords an exaggerated notion of punching, but if it does it none the less illustrates the results arising from the action of a small steam-driven punch upon a piece of boiler-plate. We have seen some scores of these big holes punched, and except in the case of very superior plates—such as may now be seen on the 48-feet target, plated with 8-inch metal, recently penetrated by the 10-inch gun—the punching process results in one or more cracks and fissures, radiating from the shot-hole as a center. Now, this is just what takes place—in a less degree, of course—in boiler plates and the plates of girders in which the holes are punched. Where, however, iron of a very superior quality is used, fracture of the surrounding parts may not take place. But the quality of iron necessary to insure this result is so rarely used in ordinary practice, that sound punched work is the rare exception, and not the rule.

Turning once more to the targets, we find the holes to have been made very rapidly and with greater economy than if a drilling machine, equally powerful as the punch, had been employed. And this is just the case with the boiler plates, and forms the secret of the preference given to the punching system. Cheapness is the great consideration, as competition cuts down prices; and no matter whether it be a boiler that may burst, or a bridge that may give way, the work must be turned out as cheaply as possible, in order that a shaving of profit may remain to the good of the manufacturer. The advocates of punching say that drilling the holes comes more expensive, and does not add to the strength of the iron, or rather that the plates are no stronger with drilled than with punched holes. But experiments prove the contrary, and some made a few years since by Mr. Barnaby, of the Admiralty, are very conclusive on this point. In one experiment with a piece of boiler-plate with punched holes, the plate broke at 10·9 tuns per square inch, between the holes. It was a very good piece of iron, standing 20¾ tuns per square inch in the unperforated plate. When the holes were drilled the plate gave way at 11¾ tuns—a small difference only, perhaps, but still a difference, and one which Mr. Barnaby, in many instances, found much greater, and in steel plates greater still. We quote the actual figures, low though they be, as being precise, and definitely answering the objections of those who say punching does not weaken the iron. The results of many experiments go to show how much the iron between the holes is injured. The superiority of the iron when the holes are drilled is mainly due to the fact that the punch breaks the iron in the neighborhood of the hole, whereas the drill does not.

Let us now, in fairness, see what further objections are urged against drilling by the advocates of punching. They assert that it is an error to resort to drilling, unless turned rivets are used. Some go so far as to say that it is unmechanical to put ordinary rivets into drilled holes. Again, they urge that in riveting hot rivets in drilled holes, there is a great uncertainty in getting the rivets to fill the holes; one cause being that the oil used in drilling is left in the hole. Then, say they, there are the sharp ragged edges, which have a tendency to cut into the heads, and, moreover, unless the ragged edges on the inside of the plates where they come together are dressed off, there is a fear of being unable to get a water or a steam-tight joint. Now, we are not inventing these reasons against our proposition that drilling is the best in order to demolish them; they are such as have frequently been urged. They are, however, vague and questionable in theory—mere refinements of reasoning, in fact, and such as are easily upset by the results of practice with drilling. The fact is that, as we have before observed, it is after all only a matter of cost, and the difference in this respect between the two systems we believe to be very slight indeed. There can be no question but that with drilled holes the plates are far less injured than when punched, and further, several plates can be drilled at the same time, which cannot be done with the punch. Here an important reduction is effected in the cost of drilled work, while the further result will be that the parts will fit more accurately together.

From what we have advanced, there can be no doubt that holes drilled in wrought-iron plates decrease the strength of the metal much less than punched holes. The metal around the circumference of the holes must certainly be much less injured, and therefore leave more strength in the plate. The question really resolves itself into one of expense, which is slightly in favor of punching. But if, by drilling, say only ten per cent. of the strength of the remaining metal is saved, it is, in a professional point of view, well worth the extra cost. With drilling the engineer is practically certain as to the strength of the plates, but with punching he is by no means sure of the result, as various qualities of iron will be more or less weakened in addition to the metal actually punched out. Hard iron is of course more injuriously affected than soft iron. The most striking testimony, however, we can adduce in support of the correctness of our views, is perhaps the fact that much attention has of late been given to drilling machines in multiplying their productive capacity. Several of these multiple drills have recently been brought forward, and the effect of course will be to reduce the cost of drilled holes, as a number of holes can be drilled at the same time. This, together with the fact of being able to drill through a number of plates at one operation, will, we hope, lead to the abolition of punched holes. Engineers may then rest satisfied that their work will give in practice the results assigned to it in theory. Moreover, we shall probably hear of fewer boiler explosions, many of which are unquestionably initiated by the damaging action of the punch on plates which are none too good in their quality to begin with. The remedy for the evil of punched holes is easy: let engineers specify for drilling, and let them see that their specification is followed by the manufacturer.—*Mechanic's Magazine.*

Texas Iron.

IT is said that Texas has "iron enough to divide the earth by railroads into sections ten miles across," but little has ever been done to develop this mineral wealth. According to a correspondent of the New York *Tribune*, a Mr. Jefferson Nash built one furnace about the year 1857, eighteen miles west of Jefferson, where he made cast-iron hollow-ware and all kinds of plantation castings and some wrought-iron. This cast-iron has been tried extensively, and proves to be of remarkably good quality, being extremely hard and strong, making the best quality of railroad-car wheels. During the war two other furnaces were erected and worked, but ceased operations at the return of peace. In 1870, Mr. George A. Kelly, seven miles northwest of the same place, built a furnace which delivered about seven tuns per day during four or five months, and he is operating it again this year. Mr. Kelly carries on a foundry and machine-shop in connection with a large plow factory. He finds that plow-points made of his own iron are as durable as steel, and his plows are now used almost exclusively throughout the light sandy soils of Eastern Texas This country will be penetrated in a few month. by the International and Transcontinental Railroads, and will present to the farmer, the mechanic, the laborer, the miner, and the capitalist the finest opportunities ever offered to them in the United States. Our navigation is good for nine months in the year; it is better than that of the Ohio River, those acquainted with both streams being judges. This, with the numerous railroads projected to run through this country, some of them, as the International, the Transcontinental, the Great Northern (of Texas), and the Southern

Pacific, in active construction, will afford rapid and easy communication with New York and all Atlantic and interior cities, and with Mexico and all her principal cities, and with San Diego and San Blas, and all Pacific cities, and with Galveston, Houston, and New Orleans, and all Gulf cities. The advantages of these numerous communications, with our boundless stores of minerals, our rich and varied soils and productions, our genial and healthful climates (for there are varieties in a territory so large as Texas), and our low price of lands, present to all classes unsurpassed inducements for emigrants to select our State for settlement. The country where the iron exists is heavily timbered, chiefly with pitch-pine of extra good quality and size, and the iron lands are held at very low prices, the mineral being regarded as 'not only useless, but deleterious, thus offering to the mining capitalists unusual inducements.

Naval Jerrymandering.

THE old question whether a reconstructed jack-knife is the same jack-knife or another is called up for discussion by the war-steamer *Yantic*, now undergoing "repairs" at the Portsmouth Navy Yard. About a year ago the *Yantic* was condemned as unserviceable. She was accordingly broken up, her keel only being preserved. With this foundation the vessel has been "repaired" so far that she is nearly ready to be set afloat again, a new and finely-modelled war-steamer. This certainly is a novel and ingenious method adopted by the Navy Department to build a new ship without the consent of Congress. The new *Yantic* will appear on the book simply as the same old condemned ship "repaired," while, if justice were done her, she would be duly christened with a name of her own, and be sent out to make her own reputation. Perhaps we need new ships, but the Navy Department should appeal directly to Congress, not attempt to circumvent our lawgivers in that way.

New Cable Schemes.

THE American Atlantic Cable Company will probably begin at an early day to lay a cable from the extremity of Long Island to a point on the English or Dutch coast. This Company was incorporated under the laws of this State by an act passed May 7, 1866. An act of Congress was passed May 29, 1867, which conferred the right to lay a cable from any point on the Atlantic coast except in Florida. The Company also received a grant from the King of Holland, in 1869, to land a cable on the coast of that country, and permission from the English Government, in 1870, to land a cable on the British coast. The incorporators of this company are A. F. Millwarth, Edward Haight, Senator Pomeroy, Willis Gaylord, Paul M. Spofford, and E. M. Birdseye. The capital stock is $10,000,000, a large portion of which has been issued. The Company has authorized an issue of bonds secured by mortgages to the amount of $6,000,000 principal, and interest at 7 per cent., payable in gold in twenty years from Nov. 1, 1870. This Company purposes to have two cables, one direct to the coast of England or Holland, and the other by way of the Bermuda and Azore Islands to the coast of Portugal. The agent, whose arrival from Europe is daily expected, has received proposals from two English houses in regard to the manufacture of the cable, and, if the Company decide to accept the propositions, operations will be begun without delay.

A proposition is now before the Legislature of California to grant permission to a company to lay a cable from San Francisco to a port in China. Cyrus W. Field and others are connected with the project, and it is believed that the measure will be passed at the present session of the Legislature, and that the work of laying a cable will speedily follow. This will complete the telegraphic circle around the world.

The Georgia Legislature has also granted to certain persons the privilege of laying a cable from that coast to a point in France; but, as Congress has jurisdiction beyond low-water mark, it is doubtful whether any advance can be made until the matter has been acted upon in Congress. Several additional cable enterprises are advocated, but the schemes have not assumed a definite form.

Breaking Palm Nuts.

THE production of oil from palm nuts is, in its way, a considerable industry. It is proposed to substitute the means now commonly used for breaking the nuts by an apparatus of which the following is a condensed description:—

"The nuts, more especially those of the palm, are raised up to the second floor of the building by means of hoisting apparatus, and are fed into a copper which delivers them into a shake or spout, the bottom of which is perforated to allow parts of the husks or other foreign matters to escape. The spout delivers the nuts into the upper end of the revolving perforated cylinder, which is placed in a slanting position. The nuts in passing down this cylinder are agitated to remove portions of the husks and other foreign matters, which are carried off by the shoot. The nuts drop from the end of the cylinder into a hopper, which delivers them to the machinery by which they are broken. This machinery consists of a drum with blades or projections on its circumference. This drum revolves at a high velocity in a casing, and the shells are broken without breaking the kernels by the rapid action of the blades on the revolving drum striking the nuts. The broken shells and the kernels, discharged by the centrifugal force of the drum, are delivered into the upper end of a perforated cylinder, which is also placed in a slanting position, so that in revolving it carries the shell and kernels to the lower end, from whence they fall into a separating cistern. The small particles of shell and husk drop through the perforations of the cylinder into a discharge shoot. The cistern contains a solution of common salt and water, or any other solution the specific gravity of which is rather greater than that of water, in order that the kernels may float on the top of the solution, while the shells sink and drop on to an endless belt or creeper, which, in traveling along, conveys the broken shells towards and into the right-hand end of the cistern, from whence they are discharged continuously by a spout. The outlet from the cistern is provided with a sliding valve, the position of which can be regulated by a lever. The lower part of the spout consists of open rods or a perforated plate, through which the solution escaping from the cistern with the broken shells is discharged on to the floor or into a suitable receptacle.

A NEW FUEL.—The *Gaulois* says that the local authorities at Paris have set a number of laborers at work to gather up the leaves falling from the trees in the parks and on the Boulevards. It is added that the leaves when pressed by machinery make excellent fuel, which is to be distributed among the poor during the present winter.

The Hartford Steam-boiler Inspection and Insurance Co.

THE Hartford Steam-boiler Inspection and Insurance Co. makes the following report of its inspections in the months of November and December, 1871:—

During these two months 1,490 visits of inspection were made, and 2,969 boilers examined—2,656 externally, and 1,096 internally, while 240 were tested by hydraulic pressure. Number of defects in all discovered, 1,566, of which 332 were regarded as dangerous. These defects were as follows:—Furnaces out of shape, 71—17 dangerous. Fractures, 99—62 dangerous. Burned plates, 95—43 dangerous. Blistered plates 204—28 dangerous. Sediment and deposit, 282—22 dangerous. Incrustation and scale, 235—22 dangerous. External corrosion, 90—24 dangerous. Internal corrosion, 45—7 dangerous. Internal grooving, 38—5 dangerous. Water gauges defective, 93—10 dangerous. Blow-out apparatus defective, 26—9 dangerous. Safety-valves overloaded and out of order, 49—14 dangerous. Pressure gauges defective, 230—14 dangerous. Boilers without gauges, 8. Cases of deficiency of water, 15—2 dangerous. Cases of broken braces and stays, 52—29 dangerous. Boilers condemned as unsafe to use, 34. Among the defects enumerated fractures are quite numerous, and we call attention to it from the fact that several cases have been found where the difficulty orignated in poor workmanship in the construction of the boiler; for instance, a case was found where a seam was cracked in line of the rivets for three feet, and on close examination it was ascertained that the defect had its origin with the "drifting tool." Several similar cases have been met with, and although presenting fractures of less extent, are perhaps none the less dangerous from the fact that a weak point in the boiler is provided upon which severe strain being brought is liable to be increased suddenly with serious results. Plates often become burned and weakened in places impossible to discover except the boiler is cold, and subjected to both internal and external examination. A case of this kind has recently come under our notice. The brickwork setting of the boiler had become broken down on the side against the brick wall of the building. The fire had gone up beyond the water-line, and badly burned and weakened the sheets exposed. The boiler was set with the front in the chimney, and the defect was so far forward that the fire escaped through the break into the chimney. No idea or apprehension of danger was suspected, until a cold examination revealed the defect and prevented disaster. We find more or less ignorance prevailing relative to the importance of a good safety-valve. And in the fitting up of a boiler or nest of boilers the ignorance of the boiler maker and fitter is often glaringly apparent. There seems to be no calculation made relative to the fitness of appliances for the work required of them. Of course this is not true of those who by long experience and careful observation have ascertained just what the wants of a boiler are; but more particularly of irresponsible concerns that have no conception of the immense strain brought to bear on boilers at work, nor of the importance of having all the appliances adapted to the size of boiler, pressure of steam carried, and amount of work required.

In a large mill using six boilers there was but one safety-valve, and the escape-pipe from this valve was only two inches in diameter. We do not think the firm making and fitting these boilers up in this way evinced a proper understanding of the principles of boiler-fitting. The boilers condemned were not all beyond repair, though many were entirely worn out. Those capable of being renovated have been put in good condition, and will doubtless last for some time yet. There were 24 boiler explosions during the months of November and December, doing serious damage, and killing 19 and wounding 38.

A KANSAS paper's cow obituary says:—"There is not a farm wagon in the country that she has not stolen something out of; not a gate in town that she has not opened; and the stones that have been thrown at her would make five miles of turnpike."

NEW AMERICAN PATENTS.

WE give, as follows, notices of some of the most interesting inventions for which Letters-Patent of the United States have recently been issued :—

HOSE-COUPLING.—A. F. Allen, Providence, R. I. —*Jan.* 30.—This improvement comprises a friction band in combination with the interior and exterior holding surfaces of a hose-coupling, interposed between the hose and either or both of said surfaces.

MALLEABLE IRON CASTINGS.—A. F. Andrews, New Haven, Conn.—*Jan.* 30; ante-dated *Jan.* 20. —This relates to a novel method of using hydrogen gas in the treatment of malleable iron castings. Also, the same in combination with the employment of a packing of lime or metallic oxyds or carbonates or silicates. Also, in such treatment, the use of hydrogen gas alternating with carbonic oxyd or analogous neutral gas.

SHUTTER FASTENER.—J. Andrews, Marlborough, Mass.—*Jan.* 30.—This novel shutter fastening device is constituted by the combination of an open-ended flanged spring case, with a double catch-lever and a perforated slotted pivot cast together in a single piece, the slot retaining the coiled spring within the case, and a single screw securing all the parts together and to the shutter.

MANUFACTURE AND PURIFICATION OF GAS FOR LIGHTING AND HEATING PURPOSES.—G. Eveleigh, London, Great Britain.—*Jan.* 30.—Among the more noticeable features of this process is the method of purifying gas, produced from coal and other substances in ordinary retorts, by passing it through a series of chambers containing one or more of the chemical purifiers. Also, a method of distilling and purifying gas from coal, or from coal and certain other materials, either in a retort connected with a series of redistillation retorts, or in one retort arranged to act both as a distillation retort and as a redistillation retort. Also, vertical redistillation retorts for purifying coal or other gas, arranged in a novel and peculiar manner. Also, a method of and apparatus for converting liquid fuel into gas before burning it, so as to render it suitable for heating purposes.

SAVING FLOAT OR FINE GOLD.—E. J. Fraser, San Francisco, Cal.—*Jan.* 30.—This invention comprises a novel mode of preparing a filtering substance or material. Also, a method of releasing the metal from the filtering substance or material. Also, a process for saving floating particles of gold or other precious metals, the same consisting in saturating a porous or filtering material with quicksilver, and, after passing the water through the filter, destroying the filtering substance for recovering the metals.

MACHINE FOR BURNISHING THE HEELS OF BOOTS AND SHOES.—R. C. Lambert, Quincy, Mass. —*Jan.* 30.—The most noticeable points in this apparatus are found in the combination, with a heel-plate on the end of a shaft, of a clamp-shaft having a sliding movement, to clamp and release the shoe, and a rotative movement corresponding to the rotative movement imparted to the heel-plate shaft. Also, in combination with the driving-shaft and gear-bar and gear for imparting motion to the heel-plate shaft, a gear-bar jointed at the opposite end of the driving-shaft, and a gear for imparting corresponding positive movement to the slide-shaft.

WALKING PLANTER.—L. D. Noble, Cerro Gordo, Ill.—*Jan.* 30; ante-dated *Jan.* 27.—This corn-planting implement combines in its construction a subsoil plow arranged for turning furrows in two directions, a corn or seed box, with mechanism for operating its dropping slides, and a cutting wheel for separating the sod in front of the plow.

WADDING, BATTING, ETC., AND MACHINE FOR MAKING THE SAME.—M. D. Whipple, Cambridge, Mass.—*Jan.* 30.—In this machine is employed a series of needles, or pins slightly roughened or barbed, set in a suitable frame or holder, and made to traverse back and forth through a bat or web of cotton, or other fibrous substance, for the purpose of interlacing and condensing the fibers. There is also claimed as a new article of manufacture a bat, web, or sheet, made in the manner described.

BREECH-LOADING FIREARM.—J. Duval, La Prairie, Canada.—*Jan.* 30.—This invention embraces the combination of a tumbler of peculiar construction with a breech-block fashioned with a flange, the former, when operated by the hammer, being adapted to communicate motion to the latter only during the first part of its backward movement, and *vice versa*. Also the combination of the hammer, the tumbler, and the extractor, the tumbler when operated by the hammer being adapted to actuate the extractor at the close of its movement.

PRESSURE ACCUMULATORS FOR HYDRAULIC PRESSES.—W. D. Grimshaw, Ansonia, Conn.—*Jan.* 30.—This pressure accumulator is constituted by a series of reservoirs in valvular communication above and below, and provided with an inlet at the lower end of one reservoir, and an outlet arranged at the upper part of a (or succeeding) reservoir, and with one or more dip tubes or passages. A novel arrangement of parts adjunctive to the above is also included in the claim.

APPARATUS FOR EVAPORATING BRINE.—R. G. Leckie, Montreal, Canada.—*Jan.* 30.—This embraces a system of pipes perforated and in close contact with the bottom of the evaporating vessel, and adapted to discharge currents of air against the bottom, for the purpose of preventing the deposition of sulphate of lime.

LOOM SHUTTLE.—J. Martin, Lowell, Mass.—*Jan.* 30.—This loom has a shuttle for weaving narrow fabrics constructed with an open back to receive the quills back of the shuttle-race, and a separate opening or space in the front or opposite side thereof to receive the tension device. There are also employed in combination with the above long tension bars, arranged between the quills and delivery eyelet in such manner as to afford uniform tension to the yarn delivered from all parts of the quills.

VACUUM TANK FOR TANNING LEATHER.—D. F. Noyes, Lewiston, Maine.—*Jan.* 30.—This tank is constructed partly of wood and partly of cement or pitch; the chamber is surrounded by one or more layers, partitions, or thicknesses of the pitch or cement. The vacuum tank is composed in part of pitch or cement, forming one or more continuous layers or stratums around the vacuum chamber, and is itself surrounded by wood.

MECHANISM FOR DOFFING AND APPLYING BOBBINS IN SPINNING MACHINES.—G. Bernhardt, Radcliffe, Great Britain.—*Jan.* 30.—Aside from certain minor points of construction, the essential feature of this invention exists in a ring rail hinged to the sliding rail or frame, in combination with suitable devices whereby the rings are caused to strike and lift the bobbins.

WASH-BOILER.—E. E. Brewster, Holly, Mich.—*Jan.* 30.—There is comprised in this improved boiler a novel arrangement of a wash-boiler, false or elevated bottom for sustaining soiled clothing, and a suction-pump communicating with the water-space beneath the false bottom, and with the interior of the boiler above the clothing. The invention also includes the combination with the wash-boiler of a false bottom, composed principally of two series of A-shaped bars appropriately arranged.

BLACKSMITH'S TOOL-BOX.—B. G. Devoe and T. Rogers, Fredrictown, Ohio, and J. C. Beals, Searsport, Maine.—*Jan.* 30.—This improved tool-box is constructed with compartments for different tools, nails, and other articles used, and revolving upon an upright spindle which is provided with a handle and with legs having casters.

MACHINE FOR CUTTING CONFECTIONERY PASTE, SOAP, AND OTHER PLASTIC COMPOSITIONS.—M. Laemmel, Bay Ridge, N. Y.—*Jan.* 30.—This machine for cutting plastic substances or compounds consists of a table and of one or more endless strands of metal wire or other suitable material stretched over suitably arranged pulleys. There is further combined with the endless strand and the table a properly provided conchoidal scraper.

BALL GAME.—E. A. Barrett, New York City.—*Feb.* 6.—This invention consists firstly in a novel construction of playing table, having pockets for the balls as in billiard tables, in which the pockets are masked by cushions; also, in which the play into the pockets is through holes in the table arranged to connect with the pockets by concealed conduits or tubular leaders. Furthermore, the invention includes an indicating device or dial, having quantities or marks upon it, which are used to control or change the play of the game, whether "mathematical" or "pool," and which is applicable to billiard-tables generally.

LIQUID METER.—W. E. Snediker, New York City.—*Feb.* 6.—This invention relates to that description of liquid meter in which reciprocating pistons working independently within measuring cylinders or chambers are used, said pistons having their action controlled by valves operated respectively each by the piston of the other cylinder. In meters of this description it has heretofore been customary to arrange the valve which controls either piston under the cylinder of the other piston, and to operate such valve directly by said piston. This arrangement involves a system of cross-passages, which are objectionable, and this invention consists in an arrangement of the valves under or in direct connection with the cylinders, the pistons of which they serve to control, but either of such valves being operated by the pistons of the adjacent cylinder. By this arrangement of the valves, a shorter and straighter or more direct arrangement of the passages is secured.

CONDENSER.—William Wright, New York City. —*Feb.* 6.—This invention relates to condensers in which the Torricellian system of action is employed in maintaining or partly maintaining the vacuum, and is more especially designed to be applied to condensers constructed to operate substantially as described in letters-patents of the United States issued to the same inventor on the 11th day of July, 1871, and whereby the same may either wholly be made surface condensers or combined surface and jet condensers. The invention consists in a certain combination of one or more perforated air and vapor pipes with the upper portion of the return water-conduit or jet-chamber mounted thereon, and into which latter the vapor to be condensed passes, when said pipe or pipes is or are arranged in such relation to said conduit that the water as it passes down the latter will suck or draw about the end or ends of the air and vapor pipes, and so create a vacuum that will cause the air and remaining vapor to be passed off down the return water-conduit. The invention also includes an adjustable arrangement of said air and vapor pipe or pipes relatively to the return water-conduit, whereby said devices may be adjusted to obtain the most perfect result.

THE gas-works in Richmond, Ind., exploded on the eve of Tuesday, Jan. 23. The engine-house and purifying-room were totally destroyed. The accident was caused by changing the purifier—the gas escaping and catching fire from an adjoining room. The gas-holders were not injured, and the supply was but slightly diminished. There was only one man in the building at the time of the explosion, and it is believed he was not fatally injured. Loss about $10,000.

A NEW safe has been invented which makes things very unpleasant for burglars. The walls are filled with gunpowder in such a manner that the blows of a sledge or the cutting of a chisel in the attempt to rob the safe will ignite the powder, blow off the outer crust, annihilate the burglar, and leave the contents of the safe uninjured.

JESSE MEYERS leaned against a shaft revolving three hundred times per minute, in a Muncy, Ind., slaughter-house. He undressed in about ten seconds, but, strange to say, he was not at all injured. His coat, pantaloons, and vest were doubtless made of shoddy.

THE exercise of a very little care would convert the waste fleshings in tanneries into a source of considerable income. If those from 200 hides were put into a kettle and tried out, the result would be from 30 to 40 gallons of oil that could be readily sold for at least $1 per gallon.

THE ANCIENT PEPPER MARKET.—Pliny, the naturalist, states that the price of pepper in the market of Rome in his time was $2 50 gold a pound in our money. The pepper alluded to must have been the produce of Malabar, the nearest part of India to Europe that produced the article

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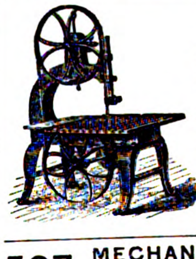

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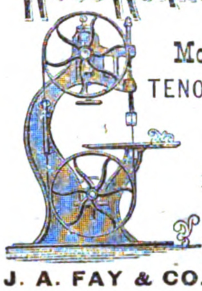

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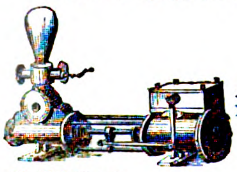

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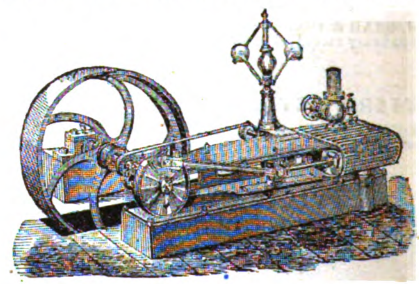

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CONTENTS OF THIS NUMBER

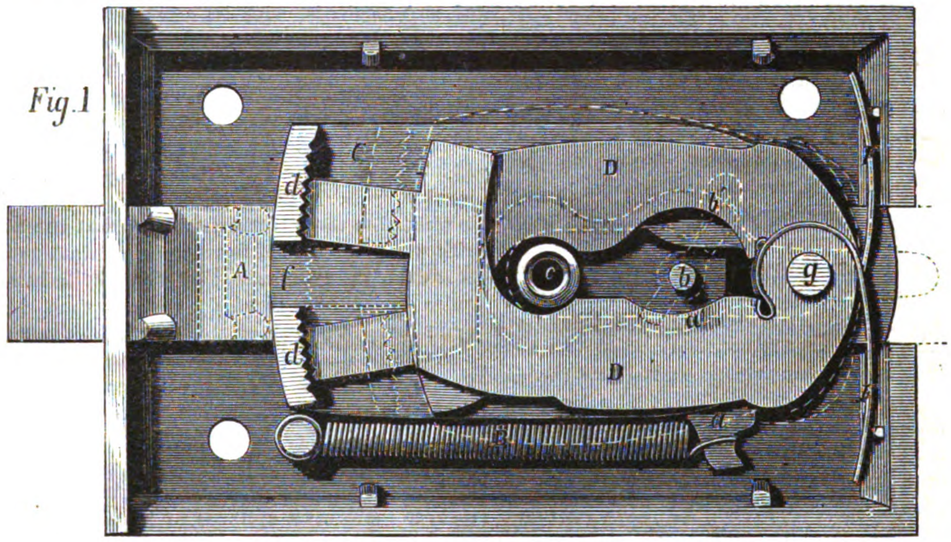
[Illustrations are indicated by an asterisk.]

Burchell's Patent Lock.

THERE are few classes of invention that have called forth greater exercise of ingenuity than has the construction of locks, and there are few in which the general public have greater interest, for the safety of life and property depends mainly upon them. A cheap and simple lock that will be practically proof against tampering is, therefore, a desideratum of no mean importance. Such an one is claimed to be provided in the device herewith illustrated, which was patented by Mr. Richard B. Burchell, of Brooklyn (E. D.), N. Y., and by him secured by letters-patent of recent date. In the engravings, Fig. 1 is a side or face view of one form of the lock, with the plate removed; Fig. 2 is a similar view of another modification of the apparatus.

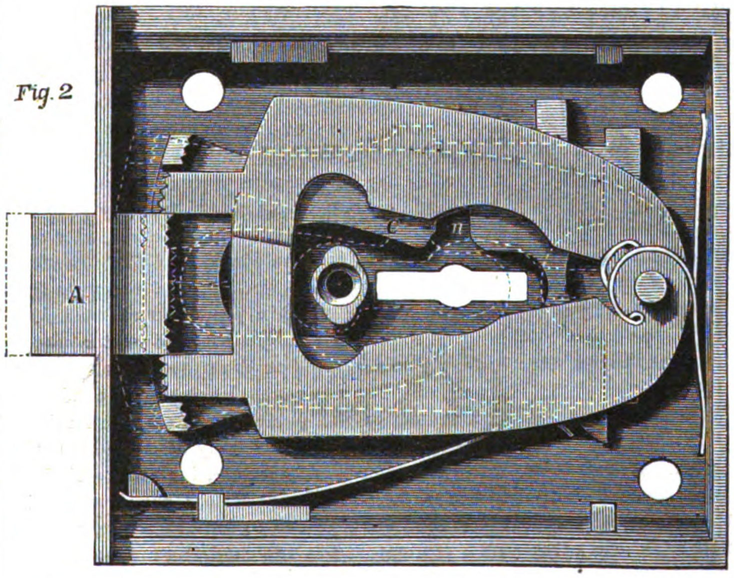
The shell or case of the lock is of the usual shape, with the bolt, A, sliding longitudinally in suitable guides provided therein. Upon the rear end of the bolt, A, is a lateral spur, *a*, to which is attached the spiral spring, B, which forces the bolt forward to the locking position indicated in Fig. 1. Upon the main length of that portion of the bolt within the case is a plate, C, constructed with studs or shoulders on its inner side, which take against similar shoulders on the bolt in such manner that any rearward or inward movement given to the plate will necessarily be communicated to the bolt to retract the same. The plate, of course, covers the bolt in such manner as to prevent all direct access thereto from or through the key-hole, the key-stud being provided at *b*, while *c* is the fixed nut which receives the screw used to retain in place the side plate of the lock-case. Upon the forward end of the plate, C, are the shoulders, *d*, with the space, *f*, between. The tumblers, D, are pivoted at their rear ends, as shown at *g*, and are furnished with the springs, F, so applied that their free or forward ends are caused to cross each other, as shown in Fig. 1, being thus brought behind the shoulders, *d*, of the plate, B, and consequently preventing any rearward movement of the same. It will, therefore, be seen that any attempt to give an inward motion to the plate, except by the proper key, would be rendered futile by this holding action of the tumblers against the shoulders on the plate by which the bolt is retracted. It will be kept in mind, of course, that both the bolt and the plate are slotted in the middle to permit the fixed key-stud, *b*, to project to its place, and to permit the requisite action of the key upon the bearing surfaces provided by the edges of the slots. When it is desired to unlock or retract the bolt, the key, of suitable configuration, is inserted, and, acting first on the bearing edges, a^1 c^1, of the tumblers, forces the same apart until the forward ends of the tumblers are brought one over the other and in line with the space, *f*, between the two shoulders, *d*, as shown in dotted outline in the engraving. The continued movement of the key then acts upon a stud or shoulder provided on the plate, C, and forces the same back or inward, the ends of the tumblers meanwhile passing through the space, *f*, without hindrance to the retractile motion of the bolt. It will be noticed that from the nearness of the key to the fulcrum or pivot of the tumblers, the movement is multiplied to the free ends of the tumblers, so that very slight variations in the bearing surfaces of the tumblers or in the key will make the plate, C, and consequently the bolt of each individual lock, immovable by any but its own proper key.

Fig. 1



BURCHELL'S PATENT LOCK.

Fig. 2



When the lock is constructed as shown in Fig. 2, the bolt and sliding-plate are made in one piece, and the tumblers, instead of having their free end crossing when holding against the shoulders by which they are enabled to prevent the retraction of the bolt, are in such position that their movement is the same as but greater in extent than the bearing surfaces immediately acted upon by the key. As a consequence, instead of passing through a central space as, in the previous instance, the free ends of the tumblers, when the bolt is drawn back, pass through two lateral ones, opposite which they are brought by the spreading operation of the key upon the tumblers previous to its action in the slot, *n*, to shoot back the bolt. This is shown in the position of the parts, which represents the bolts as partially retracted in the figure. The dotted lines indicate the position of

the parts when locked. In this form, as will be seen, the key-stud is dispensed with, the end of the key-stem fitting into a suitable socket in the lock-plate to provide the requisite axial bearing for the key.

Other modifications of the same principle may be used with similar advantages. The owners of the patent desire to dispose of it on reasonable terms. They have patterns, dies, etc., complete for several different sizes. For further particulars address Mr. Thomas L. Pye, No. 313 East Twenty-second Street, New York City.

Steam-engine Cylinders.

Much has yet to be learned about steam-engines even by otherwise able and competent engineers. Any one favored with opportunities for acquiring information concerning what is being done by the most successful firms will soon discover, if he think proper, that, even when excellent results are obtained as regards economy of fuel, they are but too often got by the application of the rule-of-thumb system to in one sense very recondite problems. It was discovered as far back as Watt's time that, by keeping a cylinder hot, less fuel was required to do a given amount of work than sufficed when the cylinder was cooled down by sending injection water directly into it. The separate condenser got rid of the injection water; but it was soon perceived that this was not enough, and the steam-jacket was added with advantage. Almost every engineer knows nowadays that a cylinder should be kept as hot as possible; but very few makers of steam-engines understand the precise reasons why a cylinder should be kept hot. If questioned on the point, they say glibly enough, "If you don't keep it hot, the steam is condensed and wasted"; but in almost all cases the belief is held that the dreaded condensation takes place by conduction through the substance of the cylinder to the outside. Of course there are men who know better, but we are not speaking now of particular firms, but of the great mass of engine-makers, who, if they use jackets at all, use them with but a dim glimmering of an idea concerning the principles on which they operate for good. We have explained and re-explained the action of the steam-jacket and the phenomena which occur within a cylinder, we hope with benefit to some individuals; but it is none the less certain that we may now treat the subject from a slightly different point of view without saying something that every one is sure to know all about beforehand.

Let us see how much steam it is possible to lose by leaving a cylinder and its appurtenances absolutely unclothed. We may for practical purposes regard the cylinder under such circumstances as an air-surface condenser. Peclet, our great authority on these questions, shows that if a current of air at 50° Fahr. be suffered to flow over cast-iron tubes, steam will be condensed within them at the rate of 0·36 lb. per square foot per hour. The cylinder of a steam-engine is a tube, and air circulates round it because, being warmed by the heated metal, it continually rises and is replaced. Now, a fairly good engine will give one horse-power indicated for every 30 lbs. of steam passing through it per hour. On Peclet's data the quantity of surface required to condense 30 lbs. of steam per hour would be 10·8 square feet. To be on the safe side, however, and to eliminate fractions, we shall suppose that every 10 feet of unclothed surface represent a loss of one horse-power indicated per hour. Let us see how this fact will apply in practice. The cylinder of an 8-horse portable engine is, we will say, 9 inches diameter. The piston stroke is 14 inches. Then the surface exposed by the cylinder, valve-chest, lids, etc., will not be far short of 6 square feet. The loss incurred therefore by not clothing the cylinder, as far as external cooling is concerned, will amount to about 0·6 of a horse-power per hour, and this loss will be approximately constant whatever the weight of steam passed through the engine. As, however, 0·6 of a horse-power bears an appreciable proportion to the power likely to be developed in such a cylinder, it is worth while to lag the cylinder carefully, by which the loss will be reduced to a mere nothing. Let us turn now to an engine of, say, 250 horse-power nominal. We shall allow as before ten circular inches of piston per nominal horse. In other words, the cylinder will have a diameter of 56·5 inches nearly. Let the stroke be 8 feet, a common proportion. The cooling surface of such a cylinder with its appurtenances would be about 170 square feet, which would suffice to condense about 17 horse-power of steam per hour. If the engine indicated 500 horse-power, the loss would therefore be very nearly $\frac{1}{30}$th of the whole work done. If the portable engine worked up to 16 horse-power, the loss would be nearly $\frac{1}{26}$th. It is more probable, however, that the large engine is worked to three times than it is that the portable would be worked to twice its nominal power. It is evident, in any case, that small cylinders require to be more carefully clothed than large cylinders. Clothed or unclothed, however, no conceivable theory based on the passage of heat to the outside of the cylinder will account for the enormous condensation which takes place in unjacketed engines expanding steam more than two or three times.

We have before now shown that, if it were possible to construct a cylinder of perfectly non-conducting materials, we should have the nearest possible approach to a perfect steam-engine. The temperature of the cylinder would have no effect whatever on the steam, if the metal were absolutely incapable of absorbing heat. The action in such a cylinder would be as follows:—Saturated steam would enter from the boiler at the beginning of each stroke. As work was performed, a portion of the steam would be condensed, and as expansion proceeded the temperature of the steam would fall, but no condensation would take place as a consequence of expansion alone; on the contrary, as the total heat of steam slightly augments with each rise in pressure, steam, when suffered to expand without doing work, becomes sensibly superheated. As, however, in the case under consideration, condensation would take place, because the loss due to the performance of work greatly exceeds the trifling gain proper to expansion, it follows that a small quantity of water would probably be deposited on the sides of the cylinder, piston, etc., but not much, because, the condensation proper to the performance of work taking place through the whole body of the steam, the water would be held in suspension and carried off to the condenser. The indicator curve would be lower than that proper to Marriotte's law by an amount measured by the condensation and consequent reduction in the volume of steam, caused by the performance of work. At the end of the stroke the steam would rush to the condenser, but no re-evaporation of water deposited on the sides of the cylinder would take place, other than that proper to the sensible heat of the deposited moisture. When the return stroke was complete, and steam was admitted for the second time, it would find the cylinder in precisely the same condition as at first; there would be no condensation due to cold surfaces, and so the process would proceed, and the maximum economical result would be obtained. Now, in practice, it is impossible to obtain a cylinder which is an absolute non-absorbent of heat, but we can bring the metal of which it is composed to such a condition that it may be regarded as perfectly neutral. It is well known that, when two bodies have exactly the same temperature, no interchange of heat will take place between them. If, therefore, we heat the cylinder to precisely the same temperature as the entering steam, no condensation will take place. The metal may be regarded as neutral, and the action will be just the same as that in a perfectly non-conducting and non-absorbing cylinder. We can reduce the cylinder to this condition by the application of a jacket. If the engine worked without expansion, no transference of heat from the jacket to the cylinder would take place, except that due, first, to the fact that the steam within the cylinder would fall a little in temperature owing to the performance of work—and even this effect would probably only take place because it is impossible to work an engine without cutting off communication with the boiler before the stroke is complete—and, secondly, because the cylinder, being opened to the condenser at the end of the stroke, its inner surface would be made cooler than its outer surface, consequently heat would be transmitted to the condenser from the jacket. If, however, the interior of the cylinder were quite dry—as it ought to be—the loss from this cause would be very small. It is certain, however, that a considerable quantity of steam is condensed in all jackets beyond that which can be accounted for by the work done; and this is no doubt due to the fact that the metal of the cylinder is kept, necessarily, at a temperature intermediate between that of the jacket and that of the condenser, though nearer to the former than the latter. Just at the end of the stroke, the inner surface of metal is so far cooled down that even when the jacket is used a small quantity of steam just entering is condensed. This is not re-evaporated until near the end of the stroke, and then it is done at the expense of the steam in the jacket, and it acts especially injuriously in that it wets the steam flowing to the condenser, and thereby renders it a good conductor. It must not be forgotten that heat takes some little time to traverse the sides of the cylinder. It is quite possible, therefore, that a sudden rush of wet steam at the opening of the exhaust may reduce the temperature of the inside face of the cylinder very considerably, and before heat can reach this surface again from the jacket the steam-port opens, and the fresh steam comes at once in contact with a surface some degrees colder than itself. Water is deposited, and has to be re-evaporated at the expense of the jacket, and so represents a dead loss, in that it has been twice evaporated and done work but once. From this it appears, first, that the sides of the cylinder should be made as thin as possible; and, secondly, that they should be of good conducting material. It may be urged that, under these conditions, the condensation in the jacket will be increased because of the influence of the condenser during the exhaust; but this argument has no force. If we but keep the exhausting steam and the sides of the cylinder, etc., dry, there will be no sensible loss. Experience has proved that practically no condensation occurs in a jacket when the engine is kept standing for long periods at the end of its stroke, communication being freely open between

the cylinder and a condenser holding a good vacuum. Paradoxical as it may seem, the best way to prevent useless condensation is, as we have said, to make the material of the cylinder as thin as practicable and of the best possible conductor. —*The Engineer.*

Results of the Gauge Controversy.

So much has been written by men of ability on both sides of the question of broad *versus* narrow gauge, that it would seem as if evidence enough had been offered to allow us to sum up the matter; and that conclusions might now be drawn which would show satisfactorily to which of them preference should be given; or at least, if neither of them is best applied to all roads, the reasons why one of them is better adapted to certain classes of roads than the other should be deduced.

Although the narrow-gauge advocates claim that economy both in first cost and also in operating is in their favor, the economical results are not alone to be considered in a decision of the question. The owners and those who operate the broad-gauge roads seem to unite in their opinion that the system of distribution by means of the wide gauge, having already compelled the abandonment of most of the exceptional gauges, is now too well established to be broken up for the uncertain advantages that a narrower one may offer; even admitting the advocates of a narrow gauge make their claims good, and this is not wholly conceded. For example, should a road diverging from Springfield, Mass., adopt the 3-foot gauge, it would not only be cut off from the roads in that State centering at Springfield, but from the benefits of distribution throughout the West. Wheat from any part of that great granary can now be contracted for, to be delivered at any point on a railroad within a radius of 30 miles from Springfield without breaking bulk, and return freights made in like manner; but all such comity of commerce would be thrown into confusion by introducing another gauge, and with it a Babel in the railroad world.

It should be noticed that by viewing the narrow gauge as a change to be made from a broad one, by taking out a central section lengthwise of the road, the amount of masonry, earthwork, and ties that is saved is but small; and also that the principal economy in construction is derived from the use of a lighter rail; but when it is proposed to adopt such a rail on roads of the ordinary gauge, with an equipment to correspond, and in this way to gain the principal advantages of the narrow gauge, viz., cheaper construction and less dead-weight to haul, the answer is made that such a course would be going backward, that the heavy rail has displaced the light one from the demands of traffic, and that, as economy of haulage has gradually increased the weight of the engine to 30 tuns and over, the heavy rail is a necessity, and, though more costly, it gives a better return than a lighter one would do with engines hauling lighter trains, and that 40-tun engines with full loads on 60 lb. rails give a better return on the capital sunk than 20-tun engines on cheaper rails.

It would seem that nothing could be advanced against such facts; the weight of the rail being governed by that of the engine, and the economy of heavy loads being admitted, that no improvement could be made by adopting a lighter superstructure.

But it is possible that the discussion of the gauges may bring about a result similar to that which has been reached in the medical profession by the advance of homœopathy, which promises to cure by infinitesimal doses, against the regulars, who relied on the *quantity* they administered. The faculty, whilst ridiculing the theory, go so far as to adopt it partially by giving smaller doses than formerly, and mankind is the gainer, without deserting the regular profession; and in like manner the roads with the uniform gauge may be gainers by adopting the strong points of the narrow gauge, without departing greatly from the system approved of by past experience. The necessary weight of rail in both systems is determined by the load on the drivers, as the load on each wheel of the cars is usually much less than that on the drivers.

One of the Fairlie's double-truck engines on the narrow gauge, weighing 20 tuns, has $2\frac{1}{2}$ tuns weight on each driver. One of the ordinary gauge 30-tun engines, with 20 tuns tender, has usually the same adhesion of 20 tuns, but each of the drivers carries from 5 to 7 tuns, requiring a proportionally heavy rail.

In one case, the adhesion due to 20 tuns weight of engine is all utilized with a weight of $2\frac{1}{2}$ tuns, tending to crush the rail at any one point, and in the other there is the adhesion from 20 tuns also utilized out of 50 tuns weight, but with 5 tuns or more crushing the rail, which must be made more than twice as heavy as in the first case. It is evident that an improvement is desirable which will utilize more of the dead-weight, whilst the weight upon a single wheel is lessened at the same time, and this must be done without complicating the machine, or lessening its ability to conform to roads already built.

The weight now thrown on a single wheel in freight-cars may amount to $3\frac{1}{2}$ tuns; should the weight on the driver be reduced to that amount, a 40 lb. rail could be substituted for the 60 lb., and the substantial saving of the narrow-gauge construction gained.

The following sketch of a plan to reach this end, with only slight changes in the present machine, is offered as a suggestion that may lead to something practical when the importance of the result is more generally appreciated than it seems to be at present:—

Taking the machine as now built, put 4 coupled drivers under the tender, with 14 tuns weight upon them, and throw the same weight upon the engine-drivers, that is, 28 tuns for adhesion, with $3\frac{1}{2}$ tuns on each wheel, the same load which the car-wheel carries, the remainder of the weight of tender and engine will be thrown on the truck-wheels. With such an arrangement of drivers, 4 under the tender and 4 under the engine, the power must be transmitted from the engine to the tender-drivers, without cramping the freedom of the tender to conform as now to the curves of the roads. It is proposed to do this in the following manner:—The tender and engine are to be coupled by a center-pin, and a shaft with cranks on its ends is to be held vertically over the tender-axle which is nearest to the engine and about 6 feet above it, by two bearings from that axle, so that the shaft must move vertically with it and not be affected by the springs of the tender. In like manner, the horizontal movement of this shaft will be governed by 2 rods that connect it with the rear axle of the engine. This additional shaft would then be supported and controlled by 4 bearings, each 2 of them resembling a letter A, with one leg vertical over the tender-axle, and the other inclined and reaching the engine axle; with the shaft at the vertex of the A. The power is to be transferred by rods from the drivers on the engine, connecting their crank-pins with pins in the cranks of the additional shaft, and thence to the tender-drivers. This arrangement would permit the axles of both engine and tender to conform to the radii, which cannot be done with any that has been proposed heretofore.

Some arrangement similar to this which will give increased adhesion and less weight on each wheel, without the complication of the Fairlie double engine, will insure to the present gauge the principal advantages in construction of the narrow one, without any essential variation in that type of road which is the result of past railroad experience.—*Van Nostrand's Magazine.*

A Large Staging.

The traveling stage used in the erection of the roof over the St. Pancras Station, London, was the subject of an interesting paper recently read before the Institute of British Architects. The roof, of 240 feet span, consists of twenty-six main ribs or rafters. Serious difficulty was anticipated in fixing these enormous ribs, which, although of great strength when joined together and fastened to the walls, were nevertheless destitute of lateral stiffness. The staging designed to overcome these difficulties was 209 feet long, 40 feet wide, and 90 feet high, and was divided into three vertical compartments, which were all screwed firmly together, and were also screwed down to the floor. The first and second ribs were fixed and fastened together by their purlins or midway supports, the two ribs being kept fast to the staging by timber slides. When the fixing of the two ribs was completed, the slides attached to the wings or outer compartments of the traveling stage were drawn inwards, the center slides remaining stationary. The two wings were then unscrewed from the floor and moved up on the slides to rib number two, and to the site of rib number three, holding rib number one by the purlins and rib number two by the slides. The center compartment was then unscrewed and moved up into position, and the whole stage was again bolted down to the floor. Rib number three was then fixed in position, and the above operation was repeated until all the twenty-six ribs were placed in position and secured. In the construction of the stage, 26,834 cubic feet of timber were used, and the apparatus was supported on 123 wheels and 19 lines of rails.

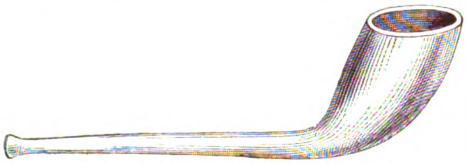
Inundation of Mines in North Staffordshire, England.

For nearly two years, thirteen mines in the neighborhood of Tunstall, Burslem, and Hanley, North Staffordshire, at which more than 2,000 hands were formerly employed, have been flooded to such an extent that work in them has been stopped. The proprietors have hitherto been unable to agree upon any combined plan for clearing the mines of the water, and the evil is gradually increasing. Mr. Knight, solicitor to the North Staffordshire Coal and Ironmasters' Association, has prepared a bill for effectually dealing with the difficulty and preventing its recurrence. This bill has been printed, and was issued on Saturday. It provides for the appointment of seven drainage commissioners, who shall have power to purchase all lands, agree for easements, provide pumping engines, and construct works for relieving the mines flooded, and prevent the flow of water into the mines in future. They may borrow to the extent of £50,000, repayable by instalments, and lay drainage rates upon mining property. If the bill does not pass, the result must be disastrous in the extreme to the trade of the district.—*Birmingham Daily Post.*

BROSELEY.

An English journal has the following sketch of the method of manufacturing tobacco-pipes, quaintly termed after the name of the place where made:—

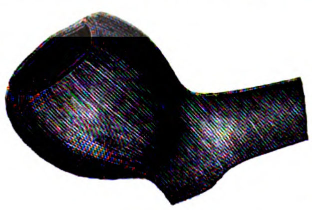
"'A broseley' is a household word with thousands who are supremely ignorant of the locality whose fame they unconsciously perpetuate. Broseley, now a quiet little town in Shropshire, on the banks of the Severn, was formerly a mining district of some importance, and its history is associated with names of no mean mark in the annals of scientific enterprise, such as Wilkinson, the friend of Telford, the Earl of Dundonald, Sir John Guest, and others whom it is not within our present purpose to enumerate. It is also distinguished for the richness of its clays, which singularly have

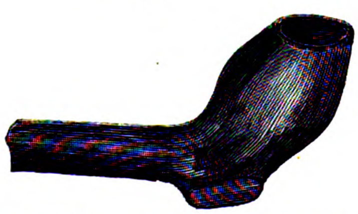


no part in the composition of its tobacco-pipes, upon the manufacture of which rests its present reputation.

"By the courtesy of the proprietors, we have had an opportunity of inspecting the manufactory of Messrs. William Southorn & Company, at Broseley, and by the aid of papers by Mr. L. Jewitt, F.S.A., of Derby, and the late Mr. Richard Thursfield, of Broseley, we are able to present to our readers the following notices, which, with the accompanying illustrations, will not be without that interest which attaches to the connection of an industry with a particular district.

"We will first glance at the early history of this manufacture, as far as it is known, in connec-





tion with Broseley, and conclude with a description of the present process.

"Mr. Thursfield took a lively and commendable interest in the subject, and during his long and active career succeeded in acquiring by far the largest and most remarkable collection of Broseley pipes in existence. Though only three examples bear date upon the bowls—viz., Richard Legg, 1687; John Legg, 1687; and John Legg, 1696—more than two hundred have marks upon the spur, not two of which are alike. Notwithstanding this absence of dates, Mr. Thursfield has been able, by careful comparison of the spur-marks with the parish registers, to trace the manufacture in Broseley as far back as 1575—a time anterior to the introduction of tobacco into England; and pronounces one Richard Legg to be 'the father of Broseley pipe-makers'; 'for even at the present day (1862) many of his descendants follow the trade in this place—from various causes, no longer as masters—and still bear the family names of Richard and John Legg.' 'No owners of the many names found on the spurs of the pipes live amongst us now as pipe-makers; and it is a curious fact that in almost every instance when a pipe-maker's name appears for the first time in the register, it is on the occasion of baptizing a child, as though they were strangers come to live in the neighborhood. I have therefore placed under the name of each maker found in the register the date of his first appearance

therein.' The illustrations which accompany this notice exhibit a few of the old pipes and marks on the spurs, selected from the specimens in Mr. Thursfield's collection; the pipes are selected to show partially the variety of forms made at Broseley at different periods, and they are engraved nearly of their full size. The collection of pipes referred to is extensive and interesting, and it would be impossible, within the limits assigned, to do it justice. One of these pipes only is ornamented—a specimen bearing the date 1687 on the bowl, on which a pattern is indented; the spur of this pipe is extremely large, and bears the stamp of 'John Legg, 1687.' There is also a series of more than two hundred stamps from the spurs of 'Old Broseleys,' of which we give a few examples. Of the marks with devices it is only necessary to particularize one. This is the device of

an open hand with the initials S. D.—probably Samuel Decon. Aubrey describes pipes made in his day by a maker named Gauntlett, 'who marks the heele of them with a *gauntlet*, whence they are called *Gauntlet-pipes*.' It is not improbable that Decon might have learned the 'whole art and mystery' of pipe-making from Gauntlett, and thus have adopted his special mark with the addition of his own initials.

"Pipe-making in the early days of its introduction was a very different matter from what it is now. Then the greater part of the manufacture was performed by the master, and twenty or twenty-four gross was the largest quantity ever burned in one kiln. This required from 15 cwt. to 1 tun of coal. Each pipe rested on its bowl, and the stem was supported by rings of pipe-clay placed one upon the other as the kiln became filled; the result was that at least twenty per cent. were warped or broken in the kiln. At the present time the preliminary preparations of the clay are performed by men, but the subsequent delicate manipulations incident to the manufacture are almost necessarily conducted by women and girls. Three hundred and fifty to four hundred gross in one kiln is not an uncommon quantity, consuming only from eight to ten tuns of coals, and the breakages do not now amount to more than one per cent. About eighty years ago the pipe-makers began to stamp their names and residences upon the *stems* of the pipes instead of on the spurs—the stems being, in many instances, eighteen inches or more in length. They likewise made a small corded mark at such a length from the bowl that, when held between the fingers at that spot, the pipe was balanced. A pipe-maker named Noah Roden brought the long pipes to great perfection, and supplied most of the London clubs and coffee-houses of that day; he died in 1829, and his business was carried on by William Southorn, who made great strides in improving the manufacture, and whose family at this present writing are the sole makers of the far-famed 'Real Broseleys.'

"Some of the pipes in Mr. Thursfield's collection, picked out of the rubbish sifted from the base of Wenlock Abbey in 1817, were very small, and, it is believed, of very early date; others were found at Buildwas Abbey, under an old oak floor, laid down probably soon after the destruction of the monastery—these also are very small and of good workmanship; the whole were collected in the immediate district.

"The clay now used is obtained mainly from Newton Abbot, in Devonshire, and is prepared by the ordinary process of boiling. It is then wedged by hand, or pugged in a mill, and rolled by hand into lengths, called rolls, required for various sizes of pipes. These are dried in the open air or by fire, and, when sufficiently so, the vent is made in the stem by a steel wire, and the roll is placed in an iron mold of the size and shape intended. A strong press is used, and an iron stopper is inserted to form the bowl. After this process they are again dried, and 'finished off' by the action of a smooth iron, carefully rubbed over the surface to obliterate any marks that may have been made, by the hand or otherwise, while in a soft state. They are then imbedded in china-clay dust in saggers, and placed in a kiln. They are subjected to a slow fire for a few days, and when afterwards 'hard' fired for two days and a night, are ready for use.

"Pipes are made in a great variety of shapes, sizes, and lengths, from four to twenty-seven inches, designated by a curiously recondite vocabulary, the origin of which is too profound a subject for light investigation. The process was shown in all its details in full operation at the London Exhibition of 1871. The articles are exported to all parts of the world."

There are 192 mills in the State of Nevada used in the crushing and reduction of various ores. Their capacity equals 6,324 horses; they carry 2,848 stamps, and cost over $10,800,000.

COMPRESSED AIR AS A MOTOR IN TUNNELS.

BY J. K. FISHER.*

I WILL briefly describe the modifications I propose in the old plan of propelling vehicles by compressed air. They consist in a means of heating the air on its way from the reservoirs to the cylinders. I use a small quantity of hydrogen or carbureted hydrogen gas; hydrogen being best in tunnels, because it does not foul the air; and carbureted hydrogen being most efficient for heating, and cheapest, and therefore best for open streets.

The gas is burned in a vessel near the cylinders, *in* the air that is to be used. It is compressed to the same pressure as the air; and issues in jets into the air, the same as gas used for lighting. It is inflamed by electricity, or any other known method that may be preferable.

Davy found that, when carbureted hydrogen is mixed with three or four times its bulk of air, it does not explode. When mixed with five or six times its bulk, it explodes feebly, and powerfully when mixed with seven or eight times its bulk. With fourteen times, it still explodes; but with more, a taper burns in it only with an enlarged flame.

Ure states that a foot of it consumes two feet of oxygen—therefore about ten feet of air—and will heat 52,000 feet of air 1°. I assume from the analogy of steam that air at 34·4 times its usual density will have a pressure of fifty atmospheres, if suddenly compressed; and will require 260 degrees of heat to restore its electricity when cooled, and prevent freezing when exhausted; hence one foot of carbureted hydrogen will heat 200 feet of air to the degree required; and for every 200 feet of compressed air we must have one foot of carbureted hydrogen, equally compressed. This assumed analogy has no warrant in experiment that I know of. I know nothing of the temperatures, densities, and pressures of air. I have searched in vain for tables of them, such as we have of steam; and I can find nothing better than this analogy to theorize upon. Of course I may be mistaken. But trial will show how much more or less gas is wanted.

Soon after Dr. Hare invented the oxyhydrogen blow-pipe, an English experimenter mixed the gases in the proportion to form water; and compressed them to a high pressure, and let them issue through a small orifice; and this gave a good result as an oxyhydrogen blow-pipe; but it was deemed unsafe, because the flame might enter the vessel and explode the contents. So, if we mix carbureted hydrogen with enough air to burn it, we may have an explosion. But a series of wire gauzes, or a tube filled with wires, will prevent the backward passage of flame. We may therefore mix the gas with the air, if not in the proportion for perfect combustion, at least in the proportion of four or five to one; and this mixture will help combustion; and will also be convenient in hot and cold weather; we can mix more or less air as we want less or more heat.

The methods of igniting this gas or its mixtures with air are, first, spongy platinum—a jet impinging on it will be inflamed; second, electricity—a small frictional electric apparatus for lighting gas-burners was shown at the last fair, and seemed capable of igniting the gas for this purpose; third, a lamp may be kept burning in the heating-chamber.

To know when the flame is out, we may touch the chamber or the exhaust-pipe. If the gas be burning, the chamber will be hot; if not, the exhaust will be freezing. An alarm may be contrived to show when the flame is out, as it may be when the car stops long. This will be a matter to think of when we have got to work and find that we need it.

I offer no opinion on the economy of compressed air compared with steam. I have no faith in it for use where we can use steam directly. But in tunnels, where steam is inadmissible, it may be expedient to use it, though it cost more than steam. Arthur Porsey, about 1848, made some experiments on an English railway; and claimed that air would be cheaper than steam for locomotives; because cheap fuel and economical boilers could be used to compress it; and air-holders will cost less than locomotive boilers for construction and repairs. And the Baron von Rathen about the same time made experiments on common roads with air; and held that it would be better than steam on roads. But nothing came of either plan. It is obvious that on common railways a locomotive must be able to run forty miles without stop, or it will be a cause of detention; therefore I think Porsey proposed too much; his locomotive would have been too heavy if it could hold air for such a run. But for city lines of five or ten miles, it may be useful even above-ground. At least, it is presumptuous to decide, without further trial, that such an agreeable motor will not be sufficiently cheap to make it preferable to steam. As for Von Rathen, there was much hope of his success, or at least much puffing; but I could not see sufficient merit in the mechanism by which he proposed to apply his air-power. Had he used steam with such mechanism, I think he would have failed. In one particular he was successful; he kept air at 800 pounds pressure from Saturday until Monday, without sensible leakage; thus showing that tight air-holders may be made.

Von Rathen stored his air in tubes for safety in case of bursting. Were the power for ten or twenty miles stored in one vessel, the bursting of it would be more destructive than that of a boiler, which generates its power as it runs, and has not in store enough at any time to run far. The Metropolitan locomotives run their steam from 130 down to 70 in going through a tunnel less than ¼ of a mile. Mr. Corson and Mr. Day, of this city, likewise store the air in tubes, each holding so little as not to be very dangerous. But to stow small tubes enough requires more room than can be had in a small locomotive, unless you take the room wanted for passengers. I propose to apply the power on a car, and to hang the tubes under the floor crosswise. I think there will be room enough to hold air for five miles; but it depends on the pressure.

I suggested to Mr. A. P. Robinson, while he was designing a plan for an underground railway under Broadway, that he would do well to consider compressed air as a motor for it. He could not have openings as the Metropolitan has; and I did not believe any practicable method of ventilation would prevent the air from being too foul for health or comfort if steam were used. His stations were to be one-half a mile apart; and he could charge at every station while the passengers were changing, and the air could be worked while hot, so that the old trouble of freezing could be avoided. But he said it would not do to propose anything but steam—which was successfully used in the Metropolitan; the people here would not listen to talk about experiments. This may be true; but as an experiment may be tried on a steam-car by substituting air-holders for the boiler at little expense, it is rash to neglect it, especially in a case in which many will apprehend intolerable foulness from steam locomotives. A successful trial of compressed air, well attested, would greatly help to get the capital to build an underground railway where open cuttings cannot be afforded.

I believe that all trials thus far have been decided failures. But I do not learn that men of sufficient engineering skill have made trials; men of greater skill have failed in steam-cars; and it would be rash to conclude from these failures that the scheme is not worthy of further trial in cases where steam is disagreeable.

The profit to engineers or speculators who have no use for such machines but to sell them is not likely to be much. If the invention is to be promoted at all, it must be by those who have franchises, as substitutes for the encouragement intended by the patent laws.

*Paper read before the New York Society of Practical Engineering, Feb. 7, 1872.

More Well-trained Engine Horses.

THE Rochester (N. Y.) *Democrat* says that by contrivance of the engineer, Seneca Dobbs, of steam fire-engine No. 2, of that city, a saving of about three minutes is accomplished in the hitching of the horses to the engine and hose-cart in case of a fire-alarm. A cord from the sleeping-room leads down into the stable, and is attached by a spring to a movable door in front of the stall, the hay-rack and oat-bin being at the side. In case of a fire-alarm, the cord is pulled, the stall door opens, and the horses rush out and take their places, the engine horses on each side of the pole, and the hose-cart horse in his position. It is a race between the men and these intelligent animals to see who can get to the post of duty first. The horses generally win.

New Harbor for Pacific Ships.

THE Australian mail steamship *Nevada*, on her last outward passage from Honolulu, stopped at the splendid harbor of Paga Paga, in the island of Tutuilla, one of the Navigators group. Mr. William H. Webb, who was on board the steamer, made arrangements with the Chief of the Island for the establishment of a coaling station there for the San Francisco and New Zealand line of steamers.

Origin of Copyright.

COPYRIGHT was a result of private enterprise. In 1556, the booksellers and printers of England formed themselves into an association known as the "Stationers' Company," and kept a register at their hall of the title of every new book, the name of its proprietor, and all transfers of ownership. In 1662, the doings of this body were legalized by Government, which prohibited any book not thus registered.

SUBMARINE TORPEDOES. — Experiments with submarine torpedoes have been making in Boston harbor, in order to familiarize the officers and men of the United States Navy with the method of handling this new instrument of warfare. Recently a hundred-pound torpedo was lowered into the water from a spar projecting from the bow of the United States steamer *Wyoming*. The torpedo was exploded by electricity, and a volume of water was sent up to a distance of 300 feet. Jets of water resembling a large fountain were also thrown to a height of 250 feet.

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For the Week ending February 13, 1872,

AND EACH BEARING THAT DATE.

[Reported officially for the "American Artisan."]

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123,545.—KNITTING MACHINE.—Charles J. Appleton, Hamilton, Canada.

123,546.—LOCK SAFETY-VALVE FOR STEAM-BOILERS.—Henry G. Ashton, East Cambridge, Mass.

123,547.—CARRIAGE-SEAT.—David Aspinwall, South Bend, Ind. Ante-dated Feb. 1, 1872.

123,548.—TOY.—Henry L. Beach, Montrose, Pa.

123,549.—COUPLING-CLAMP FOR CHAIRS.—John P. Brooks, Newark, N. J.

123,550.—CHAIR-SEAT.—Peter Buckley, assignor to himself and Charles S. Hall, Binghamton, N. Y.

123,551.—SASH-WEIGHT.—Matthias G. Burkhardt, Cincinnati, Ohio.

123,552.—DIE FOR MAKING HOES AND PICKS.—David Carr, assignor of two-thirds his right to George W. Ahl and Thomas R. Pusey, Alleghany City, Pa.

123,553.—SUSPENSION RING.—Sheldon Cary, Brooklyn, N. Y.

123,554.—DIE FOR MAKING WRENCH-HEADS.—Luke Chapman, assignor to the Collins Company, Collinsville, Conn.

123,555.—MACHINE FOR COVERING PAMPHLETS.—William H. Clague and Robert B. Randall, assignors to themselves and Ezra R. Andrews, Rochester, N. Y. Ante-dated Jan. 27, 1872.

123,556.—BUCK-SAW FRAME.—William Clemson, Middletown, N. Y.

123,557.—FASTENING FOR SATCHELS.—James F. Connelly and Bernard Conlan, Newark, N. J.

123,558.—INDICATOR PADLOCK.—H. William Dopp, Buffalo, N. Y.

123,559.—DENTAL DRILL.—Walter Scott Elliott, Goshen, N. Y.

123,560.—WASHING MACHINE.—William J. Freeman, Humboldt, Kan.

123,561.—SCROLL SAW.—Thomas S. Greenman, Mystic Bridge, and Charles A. Fenner, Mystic River, Conn., assignors to themselves, George Greenman, and Clark Greenman.

123,562.—LUBRICATING BOX AND BEARING FOR UPRIGHT SHAFTS.—Jonathan P. Grosvenor, Lowell, Mass.

123,563.—MACHINE FOR TENONING SPOKES.—Albert F. Gue, Eastmanville, Mich.

123,564.—BALANCE.—James B. Hendricks, assignor of one-half his right to Joseph Bryson, Clayton, Ill.

123,565.—SELF-LOADING AND DUMPING CART.—William H. Herbert, New Albany, Ind.

123,566.—MACHINE FOR BURNISHING BOOTS AND SHOES.—James H. Howard, Stoneham, Mass.

123,567.—CASE FOR REVERSIBLE LATCHES AND LOCKS.—Jacob Kinzer, Pittsburg, Pa.

123,568.—SPINDLE-STEP RAIL OF SPINNING MACHINES.—Henry O. Lothrop, assignor to Albert H. Gilman, Boston, Mass.

123,569.—STOVE OR RANGE KETTLE.—Llewellyn D. Lothrop, Dover, N. H.

123,570.—HEATER AND CONDENSER.—Philip W. Mackenzie, Blauveltville, N. Y. Ante-dated Jan. 25, 1872.

123,571.—VELOCIPEDE.—Henry A. Maltby, Brownsville, Texas. Ante-dated Feb. 9, 1872.

123,572.—DEVICE FOR SECURING COVERS TO VESSELS.—Charles A. Marshall, Cleveland, Ohio.

123,573.—APPARATUS FOR REMOVING AND REPLACING THE DANDY-ROLLS OF PAPER MACHINES.—James F. Marshall, Louisville, Ky.

123,574.—ROTARY ENGINE.—Gideon B. Massey, New York City, assignor to William Massey, Springfield, Mo. Ante-dated Jan. 29, 1872.

123,575.—ROTARY ENGINE.—Gideon B. Massey, New York City, assignor to William Massey, Springfield, Mo. Ante-dated Jan. 29, 1872.

123,576.—SEWING MACHINE NEEDLE AND ITS CARRYING-BAR.—Andrew W. Mathues, Media, Pa.

123,577.—SASH-HOLDER FOR CAR WINDOWS AND BLINDS.—Charles P. Mixer, Worcester, Mass.

123,578.—POST-OFFICE LETTER-STAMPING APPARATUS.—John J. Orr, administrator of Albany Packham, deceased, assignor to himself and John A. Ashbury, Carrollton, Ky.

123,579.—SEGMENTAL PUMP.—John Robertson, Brooklyn, N. Y.

123,580.—CORN-HUSKER ROLLER.—Jacob Russell, Brooklyn, assignor to the American O. K. Corn-husker Company, Greenwich, N. Y.

123,581.—SAD-IRON HEATER.—Horace W. Seaman, Millport, N. Y.

123,582.—DEVICE FOR PROTECTING AXLE-BOXES FROM SAND AND DUST.—Cornelius D. Seys, Nokomis, Ill.

123,583.—CULTIVATOR.—Samuel C. Sheller, assignor to Alfred S. Sheller, Lewisburg, Pa.

123,584.—COPYING PRESS.—Walter Shriver, New York City. Ante-dated Feb. 3, 1872.

123,585.—APPARATUS FOR DRYING SHOE SOLES.—Aaron F. Smith, Lynn, Mass.

123,586.—SAW-MILL.—Henry F. Snyder and Samuel Weymouth, assignors to H. F. Snyder and G. S. Snyder, Williamsport, and Antes Snyder, Freeport, Pa.

123,587.—SYRINGE.—William B. Snyder, Bridgeport, Conn.

123,588.—STOVE-GRATE.—James Spear, Philadelphia, Pa.

123,589.—ROLL FOR LEATHER-SPLITTING MACHINES.—Caleb S. Stearns, Marlborough, Mass. Ante-dated Jan. 27, 1872.

123,590.—MANUFACTURE OF EXTRACTS FROM SUMAC.—Thomas Steers, Jun., and John R. Sedgwick, Richmond, Va.

123,591.—CURTAIN-FIXTURE.—Charles F. Stock, Peoria, Ill.

123,592.—MACHINE FOR PEGGING BOOTS AND SHOES.—Augustus F. Strong, assignor to Northampton Pegging Machine Company, Northampton, Mass. Ante-dated Feb. 5, 1872.

123,593.—LIFTING-JACK.—Joseph Terrel, Royal Center, Ind.

123,594.—MUSIC-STAND STANDARD.—James Thornton, Oswego, N. Y.—Ante-dated Jan. 25, 1872.

123,595.—BREECH-LOADING FIRE-ARM.—George H. Tibbets, assignor to James M. Whittemore, Augusta, Me.

123,596.—COOKING-STOVE.—John L. Tucker, Laconia, and Lewis C. Dimond, Gilford, N. H. Ante-dated Jan. 25, 1872.

123,597.—THILL-COUPLING.—Abel D. Tyler, North Bridgewater, Mass.

123,598.—COMPOUND FOR STRIPPING WOOL OR HAIR FROM THE SKINS OF ANIMALS.—Jules Watteau, Antwerp, Belgium.

123,599.—BURIAL-CASE.—Jacob Weidenmann, Hartford, Conn.

123,600.—LIGHTNING-ROD.—WARREN A. Wells, St. Paul, Minn., and George House, Gallipolis, Ohio. Ante-dated Jan. 27, 1872.

123,601.—LOOM-HEDDLE.—Mary Ann Whipple, executrix of Cullen Whipple, deceased, Providence, R. I.

123,602.—STEAM-HEATER.—S. Lloyd Wiegand, Philadelphia, Pa. Ante-dated Jan. 24, 1872.

123,603.—MANUFACTURE OF RUBBER-COATED HARNESS-TRIMMINGS.—Andrew Albright, Newark, N. J. Ante-dated Jan. 27, 1872.

123,604.—CUTTING-TOOL.—Benjamin F. Allen, Boston, Mass.

123,605.—PAPER-TRIMMING MACHINE.—William G. Ayres and Seth L. Cole, assignors to Henry N. Snowden, Brooklyn, N. Y.

123,606.—ANTI-CONCUSSION WATER-COCK.—Millin W. Baily, Pottstown, Pa.

123,607.—COIN-ASSORTING AND COMPUTING APPARATUS.—Edwin Baltzley, New Philadelphia, Ohio.

123,608.—STEAM-BOILER FURNACE DRAUGHT-REGULATOR.—Edgar B. Beach, West Meriden, Conn.

123,609.—STUMP-EXTRACTOR.—Warren Beckwith, Geneva, Wis.

123,610.—RAILWAY-CAR.—William Bell, Perth Amboy, N. J.

123,611.—BUGGY-TOP.—Robert Bower, Lima, Ohio.

123,612.—COMPOUND PIPE FOR CONVEYING STEAM, ETC.—Edwin B. Buckingham, Somerville, Mass.

123,613.—DITCHING PLOW.—William Burton, Lake, Ind.

123,614.—HORSE-POWER.—Thomas C. Churchman, Sacramento, Cal.

123,615.—HUSKING-PIN.—William L. Corson, Hennepin, assignor to Robert B. Parks and John R. Parks, Princeton, Ill.

123,616.—SULKY-PLOW.—William B. Cummins, Leon, Iowa.

123,617.—MACHINE FOR CUT-MARKING WARPS.—Alexander M. Damon, assignor to himself and Oliver H. Moulton, Lowell, Mass.

123,618.—GEAR OR PULLEY MECHANISM.—Alexander M. Damon, assignor to himself and Oliver H. Moulton, Lowell, Mass.

123,619.—HOOK AND EYE.—Miranda R. S. Davis, Kansas City, assignor of one-fourth of her right to James P. Howe, Macon, Mo.

123,620.—SOFA-BEDSTEAD.—Jacob Dourson, Columbus, Ohio. Ante-dated Feb. 1, 1872.

123,621.—HYDROSTATIC WEIGHING MACHINE.—Frederic Elliot Duckham, Millwall, Middlesex, England.

123,622.—CARTRIDGE-SHELL FOR MAGAZINE FIREARMS.—George H. Dupee, assignor to the Winchester Repeating-arms Company, New Haven, Conn.

123,623.—MODE OF CONNECTING THE PISTON AND PITMAN OF STEAM-ENGINES.—Richard S. Edwards, Savannah, Mo.

123,624.—TAPE-MEASURE.—John A. Evarts, assignor to Bradley & Hubbard, West Meriden, Conn.

123,625.—MECHANISM FOR OPERATING BOBBIN-WINDING ATTACHMENTS FOR SEWING-MACHINES.—Warren L. Fish, Newark, N. J.

123,626.—FAN-ATTACHMENT FOR ROCKING-CHAIRS.—William H. Fletcher, Jun., New York City.

123,627.—METHOD OF MANUFACTURING FURNITURE-SPRINGS.—Joseph Lloyd Haigh, assignor to Eagleton Manufacturing Company, New York City.

123,628.—MATTRESS.—John J. Haley, Newton, Mass.

123,629.—STEERING APPARATUS FOR VESSELS.—Charles Hemje, Hoboken, N. J.

123,630.—FRUIT-GATHERER.—Franklin L. Hicks, assignor to himself and Oliver M. Ferguson, New Haven, Conn.

123,631.—HARVESTER.—George W. Holmes, Council Bluffs, Iowa.

123,632.—BEE-HIVE.—David Latchaw, Barkeyville, Pa.

123,633.—ANIMAL-TRAP.—Lawrence Lewis, Tuskegee, Ala.

123,634.—Not issued.

123,635.—STEAM-ENGINE.—James R. Maxwell, Cincinnati, Ohio, and Ezra Cope, Covington, Ky.

123,636.—PUMP.—Theodore J. McGowan, assignor to McGowan Brothers' Pump and Machine Company, Cincinnati, Ohio.

123,637.—EXPANSION-PIVOT FOR WHEELS OF SEWING AND OTHER MACHINES.—Emanuel Metz, Woodward, Pa.

123,638.—SCREW-WRENCH.—Charles Nell, Tippet Lane, Sheffield, assignor to Frederick Brittain, St. George's Works, Sheffield, England.

123,639.—BEER-FORCING APPARATUS.—William H. Otto and Peter Korper, Tremont, Pa.

123,640.—TAB-PLATE OF BUCKLES.—Edward Lawley Parker, Birmingham, England.

123,641.—STALK-CUTTER.—Robert B. Parks and John R. Parks, Princeton, Ill.

123,642.—FIREMEN'S AND BUILDERS' ELEVATOR.—Andrew M. Patrick, Long Lane, Mo.

123,643.—MACHINE FOR REMOVING GREASE FROM LEATHER.—William A. Perkins, assignor to George L. Newcomb, Salem, and James Perkins, Peabody, Mass.

123,644.—PRESS.—William Randle, Hadensville Station, Ky.

123,645.—HARVESTER.—Ernst Henry Ruwe, Walcott, Iowa.

123,646.—WASHING MACHINE.—George Schatz, Berlin, Canada.

123,647.—LOOM.—Joseph Smith, Somerville, and Philip McMahon, Charlestown, assignors to Joseph Smith, Somerville, and Henry W. Jackson, Boston, Mass.

123,648.—BAIL FOR KETTLES, BOILERS, ETC.—William M. Stratton, West Troy, N. Y.

123,649.—EXTENSION LOUNGE.—Charles Streit, Cincinnati, Ohio.

123,650.—HARVESTER.—Daniel H. Thayer, Ludlowville, N. Y.

123,651.—INK-FOUNTAIN.—Henry H. Thorp, Cleveland, Ohio.

123,652.—TOOL-HANDLE.—Alfred Weed, Boston, Mass.

123,653.—HALTER FOR HORSES.—Martin Wesson, Springfield, Mass.

123,654.—BEE-HIVE.—James C. White, Huntsville, Ala.

123,655.—BRAKE-SHOE.—John S. Whitworth, Norfolk, Va.

123,656.—CHURN.—David A. Willbanks, Harmony Grove, Ga.

123,657.—SASH-HOLDER.—William C. Young, Danville, Pa.

123,658.—COMPOSITION PAVEMENT AND SIDEWALK.—Nathan B. Abbott, assignor to himself, John P. Cranford, and Henry L. Cranford, Brooklyn, N. Y.

123,659.—STEAM-PUMP.—Lucien H. Allen and William Barton, Tamaqua, Pa.

123,660.—STEAM-PUMP.—Lucien H. Allen and William Barton, Tamaqua, Pa.

123,661.—STEAM-PUMP.—Lucien H. Allen and William Barton, Tamaqua, Pa.

123,662.—CULINARY BOILER.—Alexander Anderson, London Canada.

123,663.—OIL-TRAP FOR SEWERS, ETC.—William H. Anderson, Green Point, N. Y.

123,664.—SHUTTER WORKER AND FASTENER.—Jonathan Ball, Wilmington, Del.

123,665.—INNER SOLE FOR BOOTS AND SHOES.—William M. Belcher, Philadelphia, Pa.

123,666.—MEDICAL COMPOUND OR ETHEREAL OIL FOR TREATING RHEUMATISM, ETC.—Lewis J. Bell, College Corner, Ind. Ante-dated Jan. 29, 1872.

123,667.—MACHINE FOR CUTTING-OUT AND FLANGING METALLIC DISKS.—George W. Bentley, Brooklyn, N. Y.

123,668.—HIGH-WINE CISTERN FOR PREVENTING FRAUD ON THE REVENUE.—Gordon B. Bingham, Patoka, Ind.

123,669.—VALVE FOR STEAM-ENGINES.—George F. Blake, Boston, Mass. Ante-dated Jan. 29, 1872.

123,670.—STEAM-TRAP.—James H. Blessing, assignor to himself and Frederick Townsend, Albany, N. Y.

123,671.—COMBINED FORK AND BAND-CUTTER.—John H. Boffenmyer, Enterprise, Pa.

123,672.—SAFETY DEVICE FOR HOISTS.—Peter J. Borger, Cincinnati, Ohio.

123,673.—SEWING-MACHINE TABLE.—John David Browne, Madisonville, Ohio.

123,674.—MODE OF LINING BOOTS AND SHOES.—Bradley S. Bryant, Hanson, Mass.

123,675.—INSOLE.—Bradley S. Bryant, Hanson, Mass.

123,676.—CORN-SHELLER.—Jason R. Cadwell, Onondaga, Mich.

123,677.—MACHINE FOR CUTTING SHOULDERS ON BLIND-SLATS.—Peter Clark, Nashville, Tenn.

123,678.—MILLSTONE-BALANCE.—Daniel Collins, Zanesfield, Ohio.

123,679.—MAKING VEGETABLE EXTRACTS.—Thomas J. Covell Bergen, N. J.

123,680.—MANUFACTURE OF HOES.—John S. Craig, Guilford Kan., assignor to Fred. H. Aldrich, Quincy, Ill.

123,681.—MACHINE FOR FLINTING AND GLAZING LEATHER.—George Crossley, Philadelphia, Pa.

123,682.—APPARATUS FOR THE MANUFACTURE OF COAL-GAS.—Samuel Brothers Darwin, Shrewsbury, England.

123,683.—PREPARING HYDROCARBON OILS FOR USE.—Edward Dennis, assignor to Catharine Dennis, Sing Sing, N. Y., and Mary E. Carroll, New York City.

123,684.—BAG-HOLDER.—George W. Dungan and Warren Wasson, Genoa, Nev.

123,685.—CONSTRUCTING SUBAQUEOUS FOUNDATIONS.—James B. Eads, St. Louis, Mo.

123,686.—MECHANICAL DEVICE.—James M. Folsom, Louisville, Ky.

123,687.—YARN-TENSION DEVICE FOR KNITTING MACHINES.—William Franz, Bucyrus, and William Pope, Crestline, Ohio.

123,688.—VAULT-LIGHT.—James C. French, Chicago, Ill.

123,689.—HARNESS-PAD CLAMP.—James H. Garrett, assignor to I. W. Cole and Valentine Butsch, Greencastle, Ind.

123,690.—MACHINE FOR CUTTING-OUT BLANKS OF SHEET-METAL.—Charles Gatchell, Old Town, Maine.

123,691.—VELOCIPEDE-SLEDS.—Chester H. Gray, Milton, Mass.

123,692.—ANIMAL-POKE.—Josiah Green, Helmick, Ohio.

123,693.—MACHINE FOR JOINTING STAVES.—Cyrus J. Hall, Mount Desert, Maine.

123,694.—MEMORIAL CROSS.—Elizabeth W. Hall, New York City.

123,695.—ROTARY ENGINE.—William Hall, Turney Station, Mo.

123,696.—Not issued.

123,697.—BODY-PRESERVER.—Daniel L. Holden, Covington, Ky.

123,698.—WASH-BOILER.—Frederick A. Hovey, Hudson, N. Y.

123,699.—CLOTHES-HOOK.—George M. Hubbard, New Haven, assignor to Parker & Whipple Co., West Meriden, Conn.

123,700.—GATE.—Robert H. Hudgin, Fairfield, Canada.

123,701.—HARVESTER-RAKE.—William R. G. Humphrey, assignor to Artemas N. Smith, Chillicothe, Mo.

123,702.—HARVESTER-REEL.—Hiram H. Hurford and Eli Miller, Canton, Ohio.

123,703.—BAGGAGE-IDENTIFIER FOR TRUNKS.—Charles E. Ingalls, Boston, assignor of one-half his right to Daniel Wyman, Somerville, Mass.

123,704.—COTTON-HARVESTER.—William H. Irving, Philadelphia, Pa.

123,705.—METHOD OF RESTORING FILES.—Thomas James, Newport, England, assignor to J. Newton Sears, New York City.

123,706.—PORTABLE FURNACE.—William J. Keep, Troy, N. Y.

123,707.—HAND-PROPELLING CARRIAGE.—Robert Kind, New York City.

123,708.—TRUNK.—Charles W. Kinne, Cortland, N. Y.

123,709.—MODE OF ORNAMENTING HARNESS.—William W. Kitch, Crestline, Ohio.

123,710.—HAY-TEDDER.—James Lee, Pottstown, Pa.

123,711.—ELECTRICAL CIRCUIT FOR THE CHEMICAL TELEGRAPH.—George Little, Rutherford Park, N. J.

123,712.—AMALGAM FOR COATING HARNESS-TRIMMINGS, ETC.—Helen L. Macker, Boston, Mass.

123,713.—MANUFACTURE OF SULPHUROUS ACID.—Paul Marcelin, New York City, assignor to himself, Franklin Osgood, New Brighton, and Robert Warren, Brooklyn, N. Y.

123,714.—OXYGEN AND OZONIZED COMPOUND FOR HYGIENIC AND THERAPEUTIC TREATMENT OF DISEASES BY INHALATION.—Joseph Lloyd Martin, Baltimore, Md.

123,715.—CULTIVATOR.—A. S. McDermott, Ogden, Iowa.

123,716.—PORTABLE WINDLASS AND GATHERING-HOOP.—George McKaughan, deceased (Foster McKaughan administrator), Curdsville, Ky. Ante-dated Jan. 1, 1872.

123,717.—PLOW.—Francis M. McMeekin, Putnam County, Fla.

123,718.—RAILWAY-CAR BRAKE.—George H. Merriam, assignor of one-half his right to Abner O. Shaw, Portland, Maine.

123,719.—SAW MILL.—Henry E. Messimer, Williamsport, Pa.

123,720.—SAWING MACHINE.—Ferdinand Meyer, Council Bluffs, Iowa.

123,721.—SHIRT.—James H. Meyers, assignor to Oliver H. Keep, New York City.

123,722.—BILLIARD-TABLE CUSHION.—John Natus, Detroit, Mich.

123,723.—SAWING MACHINE.—Henry P. Ohm, Baltimore, Md.

123,724.—BEE-HIVE.—Samuel E. Paine and William Kerr, Xenia, Ill.

123,725.—MEAT-CHOPPER.—Daniel Peters, assignor to himself and J. M. Hunter, Fort Madison Iowa.

123,726.—METHOD OF THROWING HORSES.—Orrin S. Pratt, Batavia, N. Y.

123,727.—GRATES FOR FIREPLACES AND STOVES.—Charles S. Rankin, Cincinnati, Ohio.

123,728.—WOOD PAVEMENT.—David C. Reeves, Washington, D. C.

123,729.—LOCOMOTIVE FOR ASCENDING INCLINED PLANES.—Nicolas Riggenbach Olton, Canton of Solothurn, Switzerland.

123,730.—WASHING MACHINE.—William Riley, Madison County, Miss.

123,731.—HARVESTER-CUTTER.—Lester Russell, assignor of five-twelfths his right to Mansfield & Hoag, Otsego, Mich.

123,732.—MANUFACTURE OF ARTIFICIAL STONE.—John J Schillinger, New York City.

123,733.—PROPELLER.—Rudolph Schmidt, Cincinnati, Ohio.

123,734.—BALING PRESS.—John S. Schofield, Macon, Ga.

123,735.—STAGE MACHINERY.—James Schönberg, New York City. Ante-dated Feb. 9, 1872.

123,736.—MANUFACTURE OF BOOTS AND SHOES.—Samuel J. Shaw, Marlborough, Mass.

123,737.—HOISTING APPARATUS.—Miles Shepard, Pontiac, Mich.

123,738.—FORMER FOR MAKING FRAMES FOR SPRING PILLOWS, ETC.—Timothy S. Sperry, Chicago, Ill.

123,739.—GRATE-BAR.—John W. Stanton, assignor of one-half his right to Henry Kerstine, Barnesville, Ohio.

123,740.—BRACELET.—George D. Stevens, New York City.

123,741.—DISTILLING PETROLEUM.—John Stuber, Jacob Stuber, and John W. Mager, Astoria, N. Y.

123,742.—BUTTON-HOLE ATTACHMENT FOR SEWING-MACHINES. Augustus H. Tait, Jun., Jersey City, N. J.

123,743.—MANUFACTURE OF PHOSPHATES OF THE ALKALIES.—Benjamin Tanner, New Brighton, Eng.

123,744.—MANUFACTURE OF SUPERPHOSPHATE OF LIME.—Benjamin Tanner, New Brighton, Eng.

123,745.—HORSE-POWER.—Robert B. Tatum, Helena, Ark.

123,746.—METAL-ROLLING MILL.—Edward Thomas, Newcastle, Pa.

123,747.—MANUFACTURE OF PAPER.—Julius H. Tiemann, assignor to himself and Andrew F. Pickens, New York City.

123,748.—MANUFACTURE OF LEATHER.—Charles J. Tinnerholm, assignor to John C. White, Quincy, Ill.

123,749.—LAMP.—Charles Tribby, Washington, D. C.

123,750.—FELLY FOR CARRIAGE-WHEELS.—Marshall Turley, Council Bluffs, Iowa.

123,751.—WATER-GAUGE FOR STEAM-BOILERS.—Ezra W. Vanduzen, Cincinnati, Ohio.

123,752.—HARVESTER-RAKE.—John Walmsley, London, Canada.

123,753.—FRYING-PAN.—Frederick Pelham Warren, East Court Cosham, Great Britain.

123,754.—HAY AND COTTON-PRESS.—Christopher O. Wheeler, Mattison, Ill.

123,755.—EARTH AUGER.—Benjamin F. White and Silas R. Owen, Stewartsville, Mo.

123,756.—ADJUSTABLE ROLLING SUPPORT FOR STOVES.—Chauncey D. Woodruff, Toledo, Ohio.

123,757.—MANUFACTURE OF PAPER-PULP.—Frederick W. Zanders, Erfurt, Germany.

RE-ISSUES.

4,749.—MAKING PAPER-BAGS.—James Arkell, Benjamin Smith, and Adam Smith, Canajoharie, N. Y. Patent No. 47,376, dated April 25, 1865.

4,750.—ROTARY PUMP.—John C. Ferriss (administrator of Solomon W. Kelly, deceased), and Thomas J. Harding, assignee of one-half interest, Nashville, Tenn. Patent No. 120,819, dated Nov. 14, 1871.

4,751.—ELEVATOR.—Melancthon Hanford, Boston, Mass. Patent No. 99,433, dated Feb. 1, 1870.

4,752.—MODE OF PRINTING AND EMBOSSING CLOTH.—Lewis Murr, assignor to Joseph Metz and Bernhard Metz, Philadelphia, Pa. Patent No. 75,957, dated March 24, 1868.

4,753.—TRACTION ENGINE.—Robert C. Parvin, Philadelphia, Pa. Patent No. 119,878, dated Oct. 10, 1871.

4,754.—COUNTERSKIN.—Sewall L. Abbott, Deering, Me. Patent 117,237.—dated July 25, 1871.

4,755.—ROOT OR TONIC BEER.—(Div. A.)—Benjamin Bates, Balti- Md. Patent No. 113,617, dated April 11, 1871.

4,756.—MANUFACTURE OF BEER.—(Div. B.)—Benjamin Bates, Baltimore, Md. Patent No. 113,617, dated April 11, 1871.

4,757.—Not issued.

4,758.—SASH-LOCK.—John Hughes, New Berne, N. C. Patent No. 109,516, dated Nov. 22, 1870.

4,759.—BUCKLE.—Leonard A. Sprague, Brooklyn, assignor to Charles Goodyear, Jun., New York City. Patent No. 35,401, dated May 27, 1862.

4,760.—CAR-WHEEL.—(Div. A.)—Solomon P. Smith, Troy, N. Y. assignor, by mesne assignments, to James A. Woodbury, Boston, Mass. Patent No. 28,512, dated May 29, 1860.

4,761.—CAR-WHEEL.—(Div. B.)—Solomon P. Smith, Troy, N. Y. assignor, by mesne assignments, to James A. Woodbury, Boston, Mass. Patent No. 28,512, dated May 29, 1860.

DESIGNS.

5,510.—HAND-STAMP.—William H. Golding, Chelsea, Mass.

5,511 to 5,513.—OIL-CLOTH PATTERN.—Henry Kagy, assignor to Thomas Potter, Son & Co., Philadelphia, Pa.

5,514.—TYPE.—James Lindsay, Brooklyn, N. Y., assignor to David Wolfe Bruce, New York City.

5,515 to 5,517.—FLOOR OIL-CLOTH PATTERN.—Charles T. Meyer, Lyon's Farms, Elizabeth, N. J., assignor to Edward C. Sampson, New York City.

5,518.—CARPET-PATTERN.—Edmund Pyne, Morrisania, N. Y., assignor to Bigelow Carpet Company, Worcester, Mass.

5,519 to 5,527.—CARPET-PATTERN.—Robert R. Campbell, assignor to Lowell Manufacturing Company, Lowell, Mass.

5,528.—PULL FOR DOORS, DRAWERS, ETC.—Hermann Herlt, New York City.

5,529 to 5,538.—CARPET-PATTERN.—Henry Horan, Newark, N. J., assignor to Hartford Carpet Company, Hartford, Conn.

5,539 and 5,540.—IRON PEDESTAL.—Melville D. Jones, Boston, Mass.

5,541.—SHOE.—George E. Leathe, Reading, Mass.

5,542.—CARPET-PATTERN.—James Wade, assignor to Parks & Wade Carpet Company, Palmer, Mass.

TRADE-MARKS.

653.—BREAD.—John F. Kohler, New York City.

654.—WATER-PROOF GARMENT.—Henry Kuhlman, Boston, Mass.

655.—WOOLEN CLOTH.—Middlesex Company, Lowell, Mass.

656 and 657.—WHISKY.—Thomas E. Moore, Shawhan, Ky.

EXTENSIONS.

19,258.—FLASK FOR CASTING WHEELS.—Frederick Nishwitz. Feb. 2, 1858.

19,258.—PLATE-FRAME FOR PHOTOGRAPHIC-CAMERA.—William Lewis and William H. Lewis. Feb. 2, 1858.

19,318.—LAP-JOINT.—Henry Underwood. Feb. 9, 1858; re-issued Jan. 1, 1867, No. 2,433.

19,321.—PLOW.—George Watt, Feb. 9, 1858; improvement added Aug. 2, 1859; re-issued Aug. 4, 1868, No. 3,071.

19,328.—CANE-GUN.—John F. Thomas. Feb. 9, 1858.

APPLICATIONS FOR EXTENSIONS.

OPPONENTS of extensions must file *written* objections in the Patent Office at least 20 days before the day-of-hearing; and on the Patent Office, and state the reasons of their opposition. All testimony—*pro* or *con*—must be taken and transmitted in accordance with the official rules, which will be furnished on application. The under-named patentees have recently petitioned for extensions (for seven years) of patents granted to them in the year 1858:—

BARBARA GUJER, administratrix of JOHN GUJER, deceased, Philadelphia, Pa.—*Thick Woven Fabrics.*—Patented May 18, 1858; testimony will close on April 16, next; last day for filing arguments and examiner's report, April 26; day-of-hearing, May 1.

E. H. SMITH, Bergen Heights, N. J.—*Sewing Machine.*—Patented May 4, 1858; testimony will close on April 2, next; last day for filing arguments and examiner's report, April 12; day-of-hearing, April 17.

ENGLISH PATENT JOURNAL.

LIST OF APPLICATIONS FOR PATENTS

ON WHICH

Provisional Protections

HAVE BEEN OBTAINED IN ENGLAND BY OR FOR AMERICAN INVENTORS.

[*This list is condensed weekly from the "Journal of the British Commissioners of Patents," expressly for the* "AMERICAN ARTISAN."]

81.—METER FOR MEASURING WATER AND OTHER FLUIDS.—G. Sickels and J. H. Thorndike, Boston, Mass.—Jan. 10, 1872.

118.—COTTON-GIN.—T. Bourne, New York City.—Jan. 10, 1872

120.—REFLECTOR FOR FACILITATING THE THREADING OF NEEDLES.—S. L. Mercer, Washington, D. C.—Jan. 10, 1872.

133.—HORSE-COLLAR.—Z. C. Robbins, Washington, D. C.—Jan. 10, 1872.

140.—METHOD OF REFINING FAT OILS.—C. Morfit, Baltimore, Md.—Jan. 10, 1872.

142.—MARINE STATE-ROOM.—L. D. Newell, New York City.—Jan. 10, 1872.

144.—CARTRIDGE BOX AND KNAPSACK.—J. W. Frazier, New York City.—Jan. 10, 1872.

149.—APPLYING COLORS OR TINTS TO PHOTOGRAPHS, ETC.—H. Van der Weyde, New York City.—Jan. 10, 1872.

148.—BAG FOR CONTAINING GUANO, PHOSPHATES, AND ORES.—B. R. Croasdale, Philadelphia, Pa.—Jan. 10, 1872.

157.—BRONZING MACHINE.—E. F. Benton, Buffalo, N. Y.—Jan. 10, 1872.

181.—APPLYING POWER TO THE WHEELS OF TRACTION ENGINES PORTABLE ENGINES, ETC.—W. W. Hanscom, San Francisco, Cal.—Jan. 10, 1872.

Letter Box

E. L., OF CAL.—To "master the entire subject of irrigation" would require continuous study for at least six months. There are large volumes specially relating to it in English, French, Italian, and other languages. In India the storage room, on account of the excessive evaporation, is from 200,000 to 250,000 cubic feet per acre.

E. R., OF N. H.—We do not know that glass has ever been used to give smoothness to sleigh-runners. It would certainly give a smooth running surface, but what do you think of its probable durability?

R. N., OF IND.—None of the decorticating machines in use, we are informed, quite remove the husk from grain. The reason of this will be evident when you examine the contour of a wheat kernel deeply recessed at one side. But the process promises great economy in the production of flour from a given weight of grain, and if your new method of grinding can remove readily the small amount of husk left by the decorticating apparatus, it ought to prove a good thing.

H. C., OF PA.—The chief objection to your rotary pounding mill for pulverizing bone is its cost. Some cheap device for the purpose is needed by farmers who, with its aid and that of a carboy of oil-of-vitriol, could prepare home-made phosphates of much greater value than those ordinarily in the market.

J. G. F., OF IOWA.—A gas engineer's handbook on our desk gives the following answer to your queries:—An ordinary street lamp consumes about five cubic feet of gas per hour. In the latitude of New York or Philadelphia, each lamp, in winter, will consume from 1,800 to 2,500 cubic feet per month, in summer from 1,000 to 1,800 cubic feet per month—the average being about 1,000 cubic feet per year. Private burners consume about 5,000 cubic feet per year.

J. T. T., OF VT.—It is an axiom with railway men that in laying curves the inner rail should be cut frequently, to keep the joints as square as possible. The joints can be kept in proper form by cutting three inches from the rail as often as it is found to "run ahead" two inches. The roadway you refer to, with the inner rail run ahead two feet or more, is certainly an example of very bad practice.

M. O. D., OF MAINE.—We can give you no definite information as to the value of pine straw for gas manufacture. Such a use of it has been suggested, but it is doubtful if it has ever been tried. You had better experiment with ordinary chemical appliances to determine the quantity of gas evolved from a given weight of the pine-leaves, treating the latter precisely as you would any other resinous or oily gas material.

G. L., OF N. Y.—The largest size of drawing paper is "Uncle Sam," 48x120 inches. The next largest, "Emperor," 40x60 inches.

American Bonds Abroad.

THE European demand for American railway bonds has been a furor the past six months. It is estimated that hardly less than fifty millions of dollars of old and new railway mortgages has been taken by foreign capitalists and investors, since the close of the last war in Europe.

AT Seneca, Kansas, lately, the railroad ceased to furnish coal, and a famine was imminent until the citizens began to dig in their own yards. Now every man has a coal mine, and don't care whether the cars run or not.

THE New Haven Gas Company is going to build a telescopic gasometer, 45 feet high and 110 feet in diameter, and costing about $200,000.

AN extensive ledge of soapstone, of excellent quality, has been discovered in a hill known as "Big Tully," in Athol, Mass.

NINE of the eleven spans of the Omaha bridge over the Mississippi are complete, and trains will pass over in March.

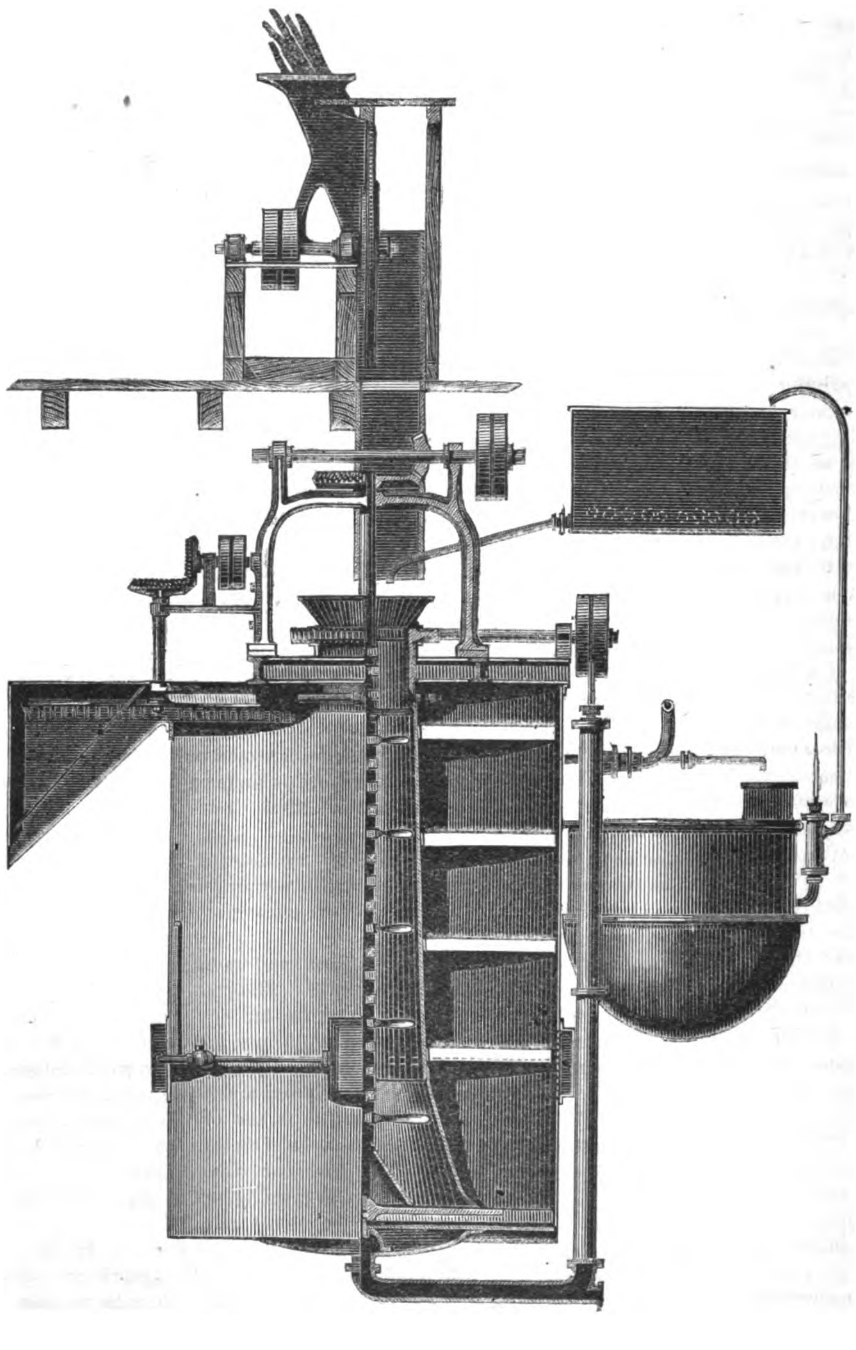
A SOLDIER writing from Montana says it has been so cold up there the traders have had to sell their whisky *by the stick*.

Robert's Diffusion Process.

THE extraction of saccharine juices by dissolving them out of the sugar-yielding material by treatment with water has long been known to yield much better results than the older method of simple pressure, this latter leaving a considerable percentage of the juice in the pulp or refuse. More recently, the same mode of treatment has been applied to cane with very satisfactory results. For example, at Aska, near Madras, in India, the quantity of juice extracted, instead of only sixty per cent., as with the usual sugar-mill, reaches eighty-five with the diffusion process, or within five per cent. of complete extraction. Very naturally, the further improvement of a process already proved to be of so great utility is now being sought, and among the apparatus believed to be the most efficient, is that designed by M. Julius Robert, of Sclerowitz, Austria, the accompanying engraving of which, together with the appended description, we take from *Engineering* :—

"This process is based on the curious osmatic properties of organic cells when placed in liquids containing different solutions. By reason of this property, the liquids mutually exchange their solutions, and gradually arrive in a condition of equilibrium as regards the degrees of concentration, the membranes of the organic cells, although apparently inpenetrable, allowing the interchange of the solutions.

"Applied in practice, the beet-root or cane is cut into slices and immersed in its own weight of water, when it gradually yields its saccharine matter, until the water and the beet or cane contain an equal percentage of saccharine matter. By employing a series of vessels charged with slices of the material in different stages of exhaustion, and adding liquids of different degrees of concentration, the whole of the saccharine matter is extracted, the process of mechanical pressure is avoided, and a better result is obtained. By the ordinary process of M. Robert, pure water is fed into a vessel containing the almost exhausted beet or cane, and thence into other vessels containing less exhausted material, until at the last water saturated to almost the maximum degree is brought in contact with the fresh slices. By this arrangement the process of extraction is constant, and the results are almost perfect. In the modification illustrated, the series of vessels is abandoned, and one single chamber is employed instead. In the center of the chamber is a feeding cylinder containing one feeding-screw driven by gearing from above. The cane or beet-root sliced is passed through a hopper to the bottom of the feeding-chamber, whence it passes out through openings into the outer cylinders or diffusers, and, gradually rising to the top, is carried off by a regulating rake driven by independent gearing. From the top of the diffuser, water is slowly supplied through small pipes, as shown, meeting in its descent the most exhausted of the slices as they rise to the discharge level, and passing through to the richer material as it becomes more and more saturated. At the bottom it issues through perforations or outlet-pipes, and is carried off to a cistern where it is heated, and is then returned upon the cane through the central feeding tube, by which the cane or beet is supplied to the diffusing-chamber. This apparatus has answered well at beet-root sugar and spirit works, and been applied to cane-sugar factories, where it promises good results."



ROBERT'S DIFFUSION PROCESS.

English Iron-clad Forts.

AN important naval event is the completion in Messrs. Whitworth's yards of the iron sea-fort destined to be erected at Spithead as a protection to Portsmouth. This is the first of the system of forts planned at Lord Palmerston's urgent recommendation as a means of defending the great war harbor. The fort will cost about £1,000,000 sterling, for the iron shell completed by Whitworth cost £450,000; besides this, the foundation has had to be artificially created, and the armament is still wanting. The skeleton has been put together for examination, and they are now taking it to pieces again and packing it off by rail to Spithead—a load in all of 2,400 tuns. The skeleton is to be fitted up with fifteen-inch iron plates, some measuring 26 feet in length, and costing £200 ($1,000) each. Each fort is to be 700 feet in circumference, 230 in height, and to be armed with two tiers of guns, one tier numbering 24, 600-pounders, and the other 25 400-pounders. These two principal forts, commanding the only deep channel leading from the sea into Portsmouth harbor, will be erected a little more than two thousand yards apart, with the channel between them and shoals known respectively as No Man's Land and Horse Sand Shoal. It is calculated that the guns will pierce twelve-inch armor at two thousand yards' distance, while no gun invented is credited with power to injure the fifteen-inch plates of the fort, however near it be brought. The approach to Portsmouth harbor may be considered safe with such a pair of sentinels to guard it. Additional forts are to be erected at Spitbank and St. Helen's, covering the outside channels leading to the harbor. The battery of St. Helen's will comprise a large central turret, containing two of the heaviest guns and two ten-inch guns mounted on turn-tables behind iron walls.—*Evening Post.*

PENCOYD IRON-WORKS.—These works are located at the Falls of the Schuylkill, near Manayunk, Philadelphia, on the line of the Philadelphia and Reading Railroad. The management makes a specialty of rolled and hammered car and locomotive axles and line shafting. The working force has been of late 220 men, and there are 14 puddling and five heating furnaces, three 3,000-pounds steam hammers, and one 1,000-pounds steam hammer. The works turn out 1,200 axles per week, and 8,000 tuns of shafting annually.

AMERICAN ARTISAN

BROWN, COOMBS & CO., Publishers.

ISSUED WEEKLY AT

No 189 Broadway, New York.

H. T. BROWN. J. W. COOMBS.

AGENTS.

AMERICAN NEWS COMPANY..................New York City.
NEW YORK NEWS COMPANY..................do
NEW ENGLAND NEWS COMPANY..................Boston.
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H. TAYLOR & CO..................Baltimore.

WEDNESDAY, FEBRUARY 21, 1872.

GRIEVANCES OF THE STEAMBOAT OWNERS.

THE owners of steamboats are growling at the legislation which compels them to adopt certain specified appliances designed to secure the safety of passengers. They assert that, so long as they are compelled to use a gauge, governor, or other device of particular construction, they are debarred from the privilege of purchasing at the lowest rates in the open market. At a meeting held in Philadelphia a few days since, it was intimated that, rather than conform to the law, some lines would carry no more passengers until the obnoxious regulations are repealed. It is to be hoped that their owners will try it, and keep it up until they are fully satisfied with the plan.

For, if the law compels the use of a special apparatus to guard against the occurrence of a particular class of accidents, it is because steamboat owners have shamefully neglected to avail themselves of any adequate means of security. The corporations and wealthy individuals who control the steam passenger navigation of the country are, above all other parties, advantageously situated for testing the utility of new safety appliances, and, if they are not satisfied with those offered them, can easily secure the invention of other and better ones. If they want the law repealed, instead of gathering in conventions to stigmatize inventors, let them jointly offer rewards for appliances capable of insuring the highest degree of safety; having obtained plans for such, let them, after full consideration of their theoretical value, test them thoroughly in practice; if successful, let them pay the inventors a fair price for their improvements, and, having thus gained a moral as well as legal right to the devices, let them manufacture the same as a part of the regular equipments of their vessels, and, having thus shown themselves willing to provide safety, they may perhaps be trusted without the stringent aid of special statutes. The public pays for safety as well as transit, and it is the business of the companies to provide it, failing in which they act the part of scamps, and nothing less. If the steamboat owners desire to use the brain-work of inventors without compensation, let them be reminded that they have a right to what they have paid for and nothing more.

BOILER EXPLOSIONS.

THE St. Louis *Republican* has published tabular statements of the steam-boiler explosions on the Mississippi during the past fifty-six years. The conclusions drawn from the data thus given are that legislation has accomplished nothing in attempting to avert this class of disasters. For a period of eighteen years previous to 1852, the year in which the law prescribing regulations for steam-power on boats and other vessels was passed, explosions occurred on twenty-seven river steamers, with a loss of one thousand and two lives. During the eighteen years subsequent to the date of the statute, boilers exploded on fifty boats, with an aggregate of thirty-one hundred killed. The obvious counter-assertion that the increase is due to the greater steam traffic on the river, and is therefore no greater in proportion to the boats employed, is rebutted by the statement that the number of boats has actually not increased, fifty per cent. of the freight being now carried on barges, instead of, as formerly, almost wholly on the steamboats. The figures, however, scarcely present a fair comparison, for the reason that in the more recent list of casualties is included the explosion on the *Sultana* in 1865. This boat was used as a Government transport, and was laden mainly with prisoners of war. The loss of life was terrible, being estimated in the schedule of our cotemporary at sixteen hundred and forty-seven, but by others placed as high as two thousand.

But, even when considered from the most favorable standpoint, the exhibit does not show the advantageous results that the public have a right to expect from legal enactments properly executed. Neither does it compare favorably with those achieved, both here and abroad, by boiler inspection companies organized on a basis that renders the discovery of a dangerous flaw, if such exists, either in the boiler itself or in any of its adjuncts, a matter of positive benefit to the company, by avoiding a source of possible expense and the possibility of cavil against the utility of the organization. It is to be feared that the steam-generators of Mississippi River craft are too frequently inspected in the same free-and-easy manner as those on some of our ferries. And the long catalogues of killed are not so much a proof of the inefficiency of legislation as a protest against the culpable recklessness that leaves a boiler month after month without as much actual care or examination as an average farmer gives to his stable floor.

It is, however, difficult to suggest, and much more so to provide, an efficient remedy. The practical man who can find a flaw with the tap of a hammer may not, and very commonly does not, comprehend the forces that are continually working to the destruction of the boiler, and consequently cannot be on the lookout for faults in the original construction of the generator. On the other hand, the expert to whom the mysteries of expansion and contraction, of sediment and priming, are matters of everyday converse, too frequently gains his knowledge only from books and expends it only upon the draughting-board, and could not determine for himself the success or non-success of his own principles of construction until settled, one way or the other, by the endurance of the boiler for a score of years or its explosion with "nobody to blame." Sometimes neither the designer nor the inspector understands his business, and then instances like that of the *Westfield* follow.

It is possible, but not certain, that better results would be obtained by causing the plans of every boiler to be submitted to a properly constituted board of experts, by whom the more flagrant violations of correct principles of construction could be condemned and avoided; the boilers being afterwards kept under surveillance by inspectors made to comply with the intent of the not yet adopted civil-service reform. But the same elements of inefficiency that attend the execution of the present law would be likely to clog the working of any other, however well devised. Probably no real safeguards will be provided to travelers on se am -vessels until public opinion forces juries to the award of exemplary damages in every case of death or injury from explosions. When this is done, and human life is paid for as lost luggage is, the steamboat companies will themselves take precautions for which people and press have, for a score of years past, been asking in vain.

STEAM-JETS vs. BLOWERS.

THE most recent improvement in providing the vacuum in front of the traveling carriage of a pneumatic tube is to send a jet of steam from an annular nozzle concentric with that end of the tube toward which the carriage is moving. The principle of this is, of course, well known. The steam or vapor carries along with it a current of air which must, perforce, be drawn from the tube. This dispenses with steam-engine, pulleys, belts, and fan, and, if simplicity is sufficient to recommend a project to use, this plan seems to merit favor wherever it is desirable to draw aeriform bodies through tubes, borings, or passages. It is doubtful if the same work can by this method be done with the same quantity of fuel as by more ordinary appliances, owing to the rapid condensation of the steam; but, conversely, the lessened cost of apparatus, avoidance of wear-and-tear, and the infrequent need of repair, will more than balance this. Of course, the pneumatic dispatch affords but slight opportunity for the development of this method of applying steam-power. Such must be sought in wider projects and more extended industries. Of these there is none that calls for amelioration more than mining. And this holds true whether of the red cinnabar deposits of the Pacific coast, the glistening sulphurets of Nevada, or the jet products of the Lehigh Valley. Only the other day, in a Pennsylvania coal-mine, three men lost their lives by an explosion of fire-damp, and the workmen in the other regions to which brief reference has just been made work in a damp, hot atmosphere, that needs the aid of the best appliances to render it passably fit for respiration by human beings. When borings can be sent down from the surface to the lowest chambers of a mine as easily as an artesian well can be drilled, and when the steam-jet offers a means for drawing up foul air as convenient as it is simple, there is little reason for the stolid indifference with which the better ventilation of mines is regarded even by those most interested in them.

But the steam-jet for this purpose is not a new thing. It was tried for mine ventilation long before its use for pneumatic dispatch tubes appears to have been thought of. Indeed, it belongs to that class of inventions which, being once tested under insufficient conditions, are condemned by practical men, so-called, and thrown into the limbo of dead projects, until some inventor who looks only to the operation of natural laws and forces, and cares not a cent for experience that attempts to contravene them, brings about a resurrection, and, properly applying the idea, proves it a success. A titled English gentleman, some years ago, created some excitement in engineering circles by advocating the steam-jet for ventilating collieries, but eminent colliery viewers sat upon it until the scheme was forgotten. Lately, however, attention is again attracted to it by trials at a colliery at Oldham, England, in which the satisfactory flow of nearly twenty-three thousand cubic feet of air per minute was obtained,

For collieries the plan would doubtless be much less costly than any other of equal efficiency, especially if dust-fuel furnaces were used, thus usefully applying a portion of the now worthless culm accumulating at the pits.

THE NEW YORK SOCIETY OF PRACTICAL ENGINEERING.

THE regular monthly meeting of the New York Society of Practical Engineering was held in the Cooper Union, Wednesday evening, Feb. 7—the president, James A. Whitney, in the chair. An able and abstruse paper on high-speed steam-engines was read by Prof. F. A. P. Barnard, LL.D., S.T.D., of Columbia College. The scientific principles involved in the working of engines having heavy and quickly moving reciprocating parts were elaborately defined by the aid of the calculus, and the deductions given in a statement of results, which we propose to publish hereafter. A paper, the brevity of which enables us to present it in our issue of the present week, was read by J. K. Fisher, on an improved method of using compressed air for the propulsion of city cars.

Converting Wrought-iron Articles to Steel.

WE notice the recent issue of a patent to Louis La Breche-Viger, of Montreal, for a new method of manufacturing axes, hammers, and other implements, by first making them of wrought-iron and then converting them into steel. As any improvement of this kind, from the numerous uses to which it can be put, is of considerable interest, we quote as follows that portion of the inventor's specification descriptive of the method:—

"The nature of the invention consists in manufacturing the articles to be treated under the process of and with wrought-iron first, and immersing them in a bath of molten cast-iron free from sulphur and phosphorus, and carburized to its utmost capacity. The best for that purpose is spiegeleisen; but in default thereof, such cast-iron may be made by melting good malleable iron or blister-steel in a cupola furnace with charcoal, or the best anthracite coal, or bituminous coal, or coke, as fuel. The articles are left in this bath a space of time which must vary with the degree of hardness desired to be imparted to the metal and with the size of the articles, and also according to the intention of converting the whole mass of the metal into steel, or simply of converting the surface so as to retain a core of malleable iron.

"For small objects crucibles may be used, and for larger articles, or when large quantities are to be converted, reverberatory furnaces of all the descriptions now known may be employed.

"After a number of operations, the cast iron bath would not be rich enough in carbon, and consequently the heat required to maintain it in a molten condition would be too high, which circumstance might cause the fusion of the parts sufficiently carburized before the underlying layers had attained to the proper degree of conversion; but to obviate this difficulty and retain to the cast-iron the required fluidity compatible with the lowest degree of heat, I line the crucibles and the bottom of the furnaces, which I build with silicious sand, with a brasque of charcoal-powder or of plumbago, into which I may incorporate nitrogenous matters, such as cyanides or animal matter, as leather or horn pulverized. This brasque is intended to supply to the bath of cast-iron the carbon which may be abstracted from it by the metal during cementation, and also the nitrogen which may be useful to the metal; but it is not indispensable to the process, as the bath of cast-iron may be renewed after each operation by using fresh cast-iron, or by remelting the same in a cupola-furnace in contact with as pure fuel as possible, and running it directly from the cupola over the objects to be converted. The converting bath of cast-iron may also be covered during the operation with a glass or slag covering, so as to prevent the loss of carbon by contact with the gas of the furnace. After remaining in the converting-bath the time required for the degree of conversion sought for, the converted articles are taken out; or, still better, the cast-iron is tapped and run off, and the heat in the crucible or furnace increased so as to free the objects from any portion of cast-iron which might adhere to them, when it will be found that they are—according as the operation has been conducted—partly or totally converted into steel, the quality of which will depend upon that of the iron used."

Fabrication of Paper in Japan.

THE extent of the paper manufacture in Japan may be estimated from this, that, according to Consul Lowden, there are about two hundred and sixty varieties, which are produced for the different exigencies of book-making, letter-writing, and drawing; the manufacture of umbrellas, fans, screens, mats, handkerchiefs, hats, coats, lanterns, the wicks of candles, tobacco-pouches, artificial flowers, etc.; and for sundry curious special purposes, such as wrapping up incense, and presents from the temples to the Government, and gifts from the Government to those whom it delights to honor.

Japanese paper is made not from rags, but from various kinds of bark, and especially from the cuttings of the paper mulberry (*Broussonetia papyrifera*), a shrub which was introduced into the country about A.D. 610. Up to the year A.D. 280, silk with a facing of linen was used for writing upon, and thin wood shavings were also employed. In that year, however, paper was imported from Corea, and this appears to have been the only paper known to the Japanese until the year 610, when two priests were sent over to Japan by the King of Corea. The introduction of a useful art from a country which has ever been and still is perhaps the least known of any inhabited region on the face of the earth, is a circumstance worthy of note. Recent events seem to afford a prospect of our soon being in a position to learn more about Corea, when it is not unreasonable to suppose that much interesting information will be brought to light respecting the origin of both Chinese and Japanese arts and customs. One of these two missionary priests—Doncho—is said to have been a clever man, learned in the Chinese classics, and, moreover, a skillful artist. Besides the manufacture of paper, he also introduced that of writing-ink and millstones. A son of the reigning Mikado learned of Doncho how to make paper. But although the paper made by Doncho was very good of its kind, it did not take ink well, it was easily torn, and was liable to become worm-eaten. We are not informed in the report before us as to the material from which this early Japanese paper was made; but it appears that the young prince referred to improved upon the original Corean processes by employing the cuttings of the paper mulberry, which tree he caused to be extensively cultivated throughout the country. At present, in the island of Kiusiu, the makodzu—as the shrub in question is called by the natives—is planted in the ninth and tenth moons (October and November); but in Kioto and its vicinity, in the first moon (February), the time varying according to the climate of the place. Each year, in the tenth moon, the plants are cut down to the roots, and from each stalk five branches appear the next year; so that in five years a large, dense shrub is developed. The cuttings of the fifth year are used for making paper. The stalks, having been cut into lengths of two and a half to three feet, are steamed in a vessel which, curious to say, is made of straw, the boiler which supplies it being about 2 ft. 6 in. in diameter. This steaming process separates the outer skin or bark from the stalk, which in itself is useless except for firewood. The skins are then dried, and afterwards washed for a day in running water to facilitate the removal of the inner fiber, which is used for making the best kinds of paper; the outer dark skin being only fit for the manufacture of a very coarse and inferior material. The fine inner fiber, which after the sap has been thoroughly expressed is called "sosori," is then boiled, washed, strained, pounded (by beating it on a wooden table with stout cudgels), and the pulp thus obtained is made up into large balls. From these balls lumps are broken off as required, and mixed with a kind of paste made from the root of the tororo plant—a shrub not unlike cotton. The mixture is stirred up thoroughly till a proper consistency has been attained, which is indicated to the ear of the operator by the noise which the mixing-rod makes when passing through the pulp. If not sufficiently sticky, more tororo-paste must be added, but the exact proportion of the ingredients can only be learned by long practice. This process is performed in a wooden trough 6 ft. long by 3 ft. broad, called a "boat," and fitted with a perpendicular rest for leaning the straining frames against. There are two of these frames employed—an outer one and an inner one. A false bottom is fixed in the outer frame, into which a portion of pulp is then poured. The inner frame is next fitted in, so as to keep the false bottom steady, and a peculiar and dexterous jerk is given to the whole, which sets the paper. The frame is then leaned against the upright rest, to allow the water to drain off, while another similar frame is being prepared. By the time the second frame is ready the first may be removed. This manipulation can be performed very quickly by experts in the manufacture. The sheet of paper is removed from the frame with a piece of bamboo, by dexterously curling the thicker end of the paper round it; a brush is taken in the right hand, and with it the paper is laid on the drying-board, the side next the board being the "face" of the paper. Five sheets are placed on each side of the board, which is six feet long. In fine weather the paper dries quickly, but in wet weather artificial heat is frequently employed for the purpose. Each manipulator requires forty drying-boards. The process of manufacture is then complete, and, the sheets being collected, two or three straws are placed between every 20, we presume to facilitate counting them. A parcel of 100 sheets is then placed upon a table, and a heavy ruler put on the top of it, and kept steady with the right hand. The paper is held in the left, and the edges cut smooth with a knife. It is then packed in bundles ready for the market.

The paper currency of Japan is made exclusively from the bark of a tree called "mitsumata," which is expressly reserved for the purpose, being but little used in the general manufacture. The bark of the kaji tree, which resembles our common willow and thrives well near water, is, however, very extensively employed for making the different peculiar kinds of paper and papier-

mâché, in the manufacture of which the Japanese specially excel. It is wonderful how proficient they are in imparting to paper the hardness and weight of heavy wood, and in manipulating it in all sorts of shapes. Some of the common paper is so tough as to be torn with difficulty.

Mr. Annesley, Acting Consul at Nagasaki, says that there is no reason why the kaji tree should not flourish in England, and that, since paper of great strength could undoubtedly be manufactured from the bark at a cheaper rate than from rags, the experiment of cultivating it in this country is worth making. As—judging from our florists' catalogues—there seems to be at present a rage for Japanese lilies and Japanese plants of all kinds, we should imagine that nothing could be easier than to give this suggestion a fair trial. We are glad to hear that inquiries have been already made at Nagasaki respecting this kaji bark by English paper manufacturers, and that samples have been sent home for examination.—*Mechanics' Magazine.*

The Austrian World's Fair.

AMERICANS should remember that Vienna is to have a world's fair in 1873. At the Paris Exhibition of 1867, nearly everything sent from this country took a prize, and there is no reason why the same thing should not be repeated at Vienna in 1873. The exhibition will undoubtedly be the largest that has ever yet been given. The park set apart for the exhibition contains four times as many square yards as have been similarly occupied, and the principal building alone will have a length of 4,650 feet. The committee having the matter in charge wish to have a full display of the raw materials and manufactured articles of each nation, with statistical information in reference to the amount produced and the trade therein. Special efforts will be made to have the art collection as complete as possible, and it is proposed to have a loan collection from all the German museums, similar to the celebrated one at Kensington. Another specialty will be a collection of articles used by different nations in their domestic affairs, kitchen utensils, furniture, dress, ornamental objects, in fact, everything used about a house. As the Austrian nation has never had an exhibition of this character, they will undoubtedly work hard to make it a success. The opportunity must not be neglected by the manufacturers of this country.

Memorial Crosses.

IT would be hard to trace to its origin the custom of providing flower-decked crosses as appropriate memorials of the dead. Perhaps it sprang from the clinging of wild blooms upon some wayside cross, or perhaps from the tender thought of some careful mourner in ages now remote. However this may be, the usage is full of poetical sentiment, and is becoming more and more thought of, until invention, perhaps for the first time, has been made to add to its attractiveness, and this, very appropriately, at the hands of a lady. Mrs. E. W. Hall, of 228 West Fortieth Street, New York City, has patented a memorial cross that may be kept in the dwelling, the school-room, or the church, and be verdant continually with the growth of ivy, and decorated on memorial occasions with cut flowers. The cross itself is provided with receptacles for the cut flowers and water for their nourishment, and also with a hollow base which may be filled with mold to support the roots of the ivy or other plant twining about the cross.

COMMUNICATIONS

TO CORRESPONDENTS.

We wish our readers to understand that, in freely publishing communications, we do not hold ourselves responsible for the opinions of our correspondents, inasmuch as we may occasionally publish views opposed to our own.

Snow Blockade.

MESSRS. EDITORS:—The New York *Tribune* suggests rival roads as a remedy for the snow blockade of the Union Pacific Railway, and the New York *Herald* calls upon some "Yankee to invent a machine to clear the track in short order by *heat*, causing the snow to melt away," and thus abate the snow nuisance, or rather prevent it, at the same time relieving the road from the smoke nuisance resulting from the sheds now used for this purpose without success.

Although not strictly speaking a Yankee, I have invented and obtained Letters-Patent (Dec. 15, 1871) for an application of heat to railways, streets, and sidewalks, for the purpose of clearing them from snow and ice, which I respectfully submit for the consideration of whom it may concern. Whether the Union Pacific Railroad will find it more economical to encounter the losses resulting from blockade than to prevent the blockade by heat depends, of course, upon facts to be ascertained by a comparison of their losses with the cost of heating the road at the points exposed to the drift, of which they alone must judge for themselves. But in regard to our Northern cities, anybody who will investigate the subject will readily be satisfied that the waste heat from the furnaces, factories, gas-works, etc., can be utilized for this purpose, to an extent which would almost if not quite dispense with any other supply of heat. By means of steam-pipes and pneumatic tubes of earthen material laid underground, the surface of the railway, street, or sidewalk can be heated to a degree that will cause the snow to melt and run off as in summer. Copies of the specifications and drawings of this apparatus can be obtained at the Patent Office. Yours respectfully, RUTGER B. MILLER.

UTICA, N. Y., Feb. 11, 1872.

P.S.—The snow and ice from the roofs, eaves-troughs, and conductors of our houses may be cleared by the internal heat applied by tin conductors. See specifications and drawings of letters-patent issued April, 1871.

The Treasure in Cumana Bay.

THE American expedition to recover Spanish treasure sunk on the *San Pedro de Alcantara* in Cumana Bay, to which we have once or twice made reference in previous issues of the AMERICAN ARTISAN, is reported to have met with an unexpected obstacle. The Superintendent, Mr. George W. Fuller, of Norwich, Conn., has arrived home, and reports that after his exploration of the hull of the sunken vessel, it was found that the treasure-room had been above and abaft the after magazine, and by the terrific force of the explosion the contents were blown into the air and scattered broadcast over the bay. A small number of loose coins remained in the wreck, into which they had fallen, but the millions covered the bottom for an area of an acre around the stern. The wreck having been cleared without result, about the 1st of January the bottom of the sea for a great distance was thoroughly dredged and tested. The examination, carefully made, convinced Mr. Fuller and the other officers that great sums of money are actually buried there, but that in order to obtain it an entire new outfit must be made. This is at once to be done, and the dredging resumed.

Rice Culture in California.

CALIFORNIA consumes annually three hundred million pounds of rice, nearly all of which is imported from Asiatic countries. The average price per pound of the commonest Asiatic rice is seven cents. There is no reason why California should not in time grow rice enough herself to supply all her wants. The State has, in the valleys of the Sacramento and San Joaquin Rivers, a vast quantity of swamp-lands well suited for rice culture. The climate is good, and the soil rich and fertile enough to insure good crops. The failure of a previous experiment, made in 1870, with a few acres only, was due to the fact that the seed was put in too late, and that consequently the crop was killed by the frost. With proper care and a better understanding of the principles of rice culture, such a disastrous result need not occur again. The journals of the Pacific coast are now urging agriculturists to turn their attention to this branch of industry.

Tanite.

THE progress made within a few years past in the manufacture of solid emery-wheels, and of machinery specially adapted to their use, has been so great that this branch of industry has been consolidated into a distinct specialty, and concentrated in the hands of a few enterprising firms. The successful introduction and use of these goods depends so entirely upon experience, that the customer is only safe when he deals with some establishment of known enterprise and skill. Hitherto, the manufacture of emery-wheels and of emery-grinding machinery has been in separate hands. The Tanite Company, of Stroudsburg, Pa., have lately given good evidence of progress in the erection of machine-shops, where they are now busily engaged in the production of emery-grinding machinery. It is not true, however, that they are now putting such machinery in the market for the first time, or merely on trial; inasmuch as hundreds of machines made under their patents and from their patterns are running in all parts of the United States. But they have abandoned the contract system previously adopted, and now make all their own machines. The Tanite Company have reduced both branches of this business to a system, and, making this system a distinct specialty are making use of the best mechanical and chemical skill, and an unusual spirit of business enterprise. They hope that before long the industrial public will begin to recognize the great value of this class of goods to which reference has just been made.

Colossal Casting.

THE largest iron casting ever attempted has been successfully achieved at the Elswick Ordnance Works, Newcastle-on-Tyne, under the direction of Sir William Armstrong and Capt. Noble. It was a huge anvil block, weighing 125 tuns, to be used, with a 20-tun double-action forge-hammer, for performing the necessary forging for the 35-tun Armstrong gun.—*The Engineer.*

NEW AMERICAN PATENTS.

We give, as follows, notices of some of the most interesting inventions for which Letters-Patent of the United States have recently been issued :—

Lamp-chimney.—E. Blackman, New York City.—*Feb.* 6.—This improved lamp-chimney consists of sheets of mica, united by means of doubled and indented or perforated metal strips, and provided with means of attaching it to the base. The claim also embraces a novel construction of the said base.

Spring Bed-bottom.—W. T. C. Davidson, Hannibal, Mo.—*Feb.* 6.—This inventor claims the application and use of a single elastic loop or ring, in combination with a metallic sleeve. Also, the combination of metallic slats in series by the use of transverse bars with slot-headed pins, connecting-straps, a metallic shoe, bearing-rests, and a metallic sleeve, the whole appropriately arranged with reference to each other.

Manufacture of Fluid Extracts.—J. De Puy, Grand Rapids, Mich.—*Feb.* 6.—This novel method of making fluid extracts consists in subjecting the vegetable substance to be exhausted to maceration under a high degree of pressure without the application of heat, and subsequently expressing the extract from the woody fibers by a suitable press.

Harness-hook.—J. U. Fiester, Winchester, Washington, Ohio.—*Feb.* 6.—This harness-hook is formed with a hook and a hollow end or loop, in combination with a wedge-shaped end of the rein or other article of harness to which it is applied, when so arranged that the wedge-shaped end may be pushed up to attach the hook, and when pulled back prevents displacement of the hook.

Cartridge for Breech-loading Fire-arms.—J. M. Milbank, Greenfield Hill, Conn.—*Feb.* 6.—The essential features of this invention comprise a cartridge-case made with a metallic cup-shaped base and paper cylinder, connected together and rendered waterproof by soluble glass or silicate of soda. Also, a primer consisting of a fulminate tube, containing detonating material and grains of sand or the like, when mixed together and introduced in a plastic state. Also, a priming tube for cartridges, containing fulminating material without an anvil, and pressed in the tube in a sufficient mass to sustain itself against the blow that causes the ignition.

Electro-signaling Apparatus for Fire-engines.—W. H. Mumler, Boston, Mass.—*Feb.* 6.—Among the more notable points of this invention is a novel process of signaling from the hoseman to the engineer or foreman of a steam fire-engine, by means of electro-magnetism. Also, the combination with a fire-engine and the leading hose thereof of a battery and signal mechanism located on the engine, and conducting-wires leading from said battery and signal mechanism to the leading hoseman, and a suitable circuit-closer at or near the " butt " or discharge-pipe, for the purpose of transmitting signals from the hoseman to the engineer or foreman. Also, in combination with each length of the leading-hose, a cable consisting of one or more insulated wires attached thereto, either inside or outside of the hose, and provided with suitable couplings for uniting two contiguous lengths, and insuring a connection between the same.

Hose.—J. Sharp, Cincinnati, Ohio.—*Feb.* 6.—This is a riveted hose, composed of sheets of leather or other suitable material, the sides of which are cut parallel and their ends at a right angle to their sides, in order that when their edges are riveted together the joints shall be formed spirally both lengthwise and crosswise of the sheets.

Traction Engine.—J. Greenside, Steeple-near-Maldon, England.—*Feb.* 6.—This improvement embraces the boiler of a movable engine, connected with the driving engine or shaft, and hung on trunnions to be adjustable to varying degrees of inclination. Also, the combination of the pivoted boiler with a front screw and rear screws suitably arranged.

Hinged Joint for Car-seats.—G. W. Perry, New Castle, Del.—*Feb.* 6.—The gist of this invention lies in the combination with the back of a car or other seat of a plate of metal, having in or upon it a stop for controlling the movement of said back upon its pivot, an arm or lever for connecting the back to the frame, said arm or lever being provided with a socket for the reception of a spring, and with projections or equivalent devices for determining the position of the back of the seat with reference to its pivoted point, and a spring for causing and regulating the contact between the arm and plate.

File-griping Handle.—A. Weed, Boston, Mass.—*Feb.* 6.—This new tool-griping handle has, in combination with the handle-receiving socket-ring, its stationary jaw and its movable or griping jaw, a cam or eccentric rotative movement of which not only forces the griping-jaw against the file, but locks the handle and socket ring together.

Safety-valve for Steam-engines.—H. W. Adams, Philadelphia, Pa.—*Feb.* 6.—The novel feature of this apparatus consists in safety-valves applied to the cylinder of a steam-engine, and constantly loaded by the pressure of steam in a supplemental steam cylinder, which communicates with a steam supply-pipe, and to which are fitted pistons attached to said valves.

Telegraphy.—W. C. Barney, Washington, D. C.—*Feb.* 6.—This improvement in means of transmitting telegraphic messages consists in sending the message over the ground line from a transmitting to a receiving instrument before it has made a transit of the wire, that is to say, by placing the transmitting instrument between the positive pole of the battery and ground, and connecting the air-line with the negative pole of battery. Also, in a novel method of arranging the message-receiver or message-repeater between the ground wire and negative pole of the battery.

Manufacture of Steel.—J. Baur, Brooklyn (E. D.), N. Y.—*Feb.* 6.—This process involves the exposure of molten iron while in a converter to the action of a compound made of nitrate of soda, binoxyd of manganese, and lime. The claim also covers the process of manufacturing steel from crude iron by first exposing the iron to the action of a compound of nitrate of soda, binoxyd of manganese, and lime, and then treating the product with ferro-manganese.

Manufacture of Flour.—L. G. Binkly, Baughman, Ohio.—*Feb.* 6.—This inventor claims, in the manufacture of flour, the combination and arrangement of a middlings separator or purifying machine in direct connection with the bolting reel and the grinding burrs, for the purpose of subjecting the middlings, during the run, to the action of said purifier, intermediately in their passage from the bolt to the burrs, to be reground with the unground grain or in auxiliary burrs and rebolted with the meal.

Hydrocarbon-burning Steam-boiler.—A. G. Buzby, Philadelphia, Pa.—*Feb.* 6.—The novel features of this apparatus include the application of heat to a tubular boiler by injecting directly into the tubes hydrocarbon vapor or inflammable gas. Also, in combination with the refractory lining of a boiler-tube, a coil of tubing.

Apparatus for manufacturing Soap.—E. H. Gibbs, New York City.—*Feb.* 6.—In this apparatus is employed an agitator composed of spirally arranged concave blades on a horizontal shaft in combination with a close mixing chamber for stirring, lifting, and forwarding the materials and mixture within the said chamber while acted on further by heat and pressure.

Telegraph Apparatus.—G. Little, Rutherford Park, N. J.—*Feb.* 6.—This comprises two electro-magnets and a vibrating armature, in combination with a local circuit connected with one of the electro-magnets, and with switches for directing the main line current either through the other electro-magnet or through both the electro-magnets.

Heaters and Condensers.—P. W. Mackenzie, Blauveltville, N. Y.—*Feb.* 13.—This invention is applicable either to the heating or cooling and condensing of various fluids, vapors, and gases, and consists in a method whereby the outside fluid is introduced to and passed off or from the tubular vessel or barly at numerous and uniform points, which causes a more equable action generally, and equalizes the expansion and contraction of the tubes.

Amusing Trial of a Railway Brake.

An exchange says that not long ago there was a man in Mauch Chunk, Pa., with a patent air-brake for railroad cars for sale. He claimed that it would stop a train going at the highest rate of speed in half its own length. There was a certain railroad man up there who treated this suggestion with scorn, and said he would wager large sums that the air-brake would not stop a train any quicker than any other brake. So he borrowed the contrivance, and fixed it on an open car on the Switchback Railroad, and went up to the top of Mount Pisgah to get a fair start. He let it come down the inclined plane for a while until it began to move along at the rate of sixty miles an hour, and then he suddenly placed his foot on the brake and put it on with full power. One minute later the eye of any solitary traveller passing through those wilds might have observed a car standing perfectly still on the track, and a railroad man going down-hill among the blackberry bushes and underbrush, headforemost, at the rate, say, of forty-six miles an hour. He was carried home on a stretcher, and now that railroad man not only has perfect faith in the availability of the air-brake, but he is convinced that it would be a good thing if some man would invent a machine for taking general demoralization, as it were, out of a flattened nose.

Great Steam-engine.

What is claimed to be the largest stationary engine in the world was put into operation a few days ago at the Lehigh Zinc Works, at Friedensville, Lehigh County, Pa. It is of three thousand horse-power, its weight 650 tuns, and is capable of pumping, if necessary, from 15,000 to 17,000 gallons of water per minute, and this from a depth of three hundred feet. The heaviest pieces are sections of beams weighing 24 tuns. The cylinder is 110¼ inches in diameter, and the length of stroke is 10 feet. Two wrought-iron shafts weigh 16 tuns each. Crank-pins, 1 tun each. The piston-rod is 14 inches in diameter. The crosshead weighs 8 tuns. The connecting-rods weigh 11 tuns each ; their length is 41 feet 2½ inches, and their diameter 9 inches in the neck and 15 in the middle.

A Jersey Editor on Kilometers.

During the Franco-Prussian war, a great deal of fun was poked at the New Jersey editor who read in the cable dispatches that "Bazaine has moved twenty kilometers out of Metz." He thereupon sat down, and wrote an editorial, in which he said he was delighted to hear that all the kilometers had been removed, and that the innocent people of Metz were no longer endangered by the presence of those horrible engines of war—standing upon a volcano, as it were. And then he went on to describe some experiments made with kilometers in the Crimea, in which one of them exploded and blew a frigate out of water.

Eight hundred sewing-machines, worth $60 apiece, have been furnished to sewing-girls at $16 by the Relief Society of Chicago, the sewing-machine company furnishing them at a very low figure, the Society giving a portion outright.

Pop-corn is a luxury in England. A firm in Galesburg, Ill., has just shipped forty barrels of it to London.

There are at present about 30,000 people at work in the South African diamond fields.

Scientific Items.

ADULTERATION OF BONE-DUST.—Ground bones are now, it appears, occasionally adulterated with the turnings and raspings of vegetable ivory, otherwise known as the ivory-nut (phytelephas macrocarpa). This fraud may be detected by heating the bone-dust to redness. Spurious samples will leave a much smaller amount of ash, or fixed mineral matter, than the genuine kind, and will be found especially deficient in phosphate of lime.

IRON-PAPER.—German journals complain that this article, which is simply common paper mixed while in the pulp with iron filings, so as to increase the weight, is "shamelessly advertised in all English and American papers," and is particularly recommended to shop-keepers for wrapping up their wares. As the papers in which groceries are put up are generally weighed along with the article, there can be no doubt that the use of such paper is fraudulent. But we must demur to the assertion that it is advertised in all English papers.

DRESSING OF WOVEN GOODS.—Another source of complaint is the amount of "dressing" found in many fabrics of English manufacture. This frequently amounts to 25 per cent. of the goods, and leaves, when ignited, five per cent. of mineral matter, including alumina and salts of magnesia.

ADULTERATION OF SAFFRON.—It appears that saffron can be adulterated with carbonates of lime to a considerable extent without its appearance being modified so as to excite suspicion. Such adulterated samples have been known to yield 12·72 per cent. of ash, whilst that of genuine sample does not exceed 4·41 to 5·9 per cent.

CHLORAL HYDRATE AS A REDUCING AGENT.—Hager states that chloral hydrate in conjunction with soda or potash is a powerful reducing agent. Gold and the platinum metals are thus easily and perfectly reduced. Chloroform is generated, and the metals are very easily washed. Silver is not perfectly reduced from its salts, as a quantity of chloride is produced, and the salts of mercury are not reduced at all.

EXTRACT OF MADDER.—Steam-dried garancine is extracted with boiling sulphureted hydrogen. From the residue the fatty matters are removed with bisulphide of carbon. The mass is next treated with alkali, avoiding excess, and from this solution the extract is thrown down by the careful addition of an acid. The flocculent yellow matter, when well washed, assumes the condition of a paste.—*Mechanics' Magazine.*

AN English steamer, the *Salsette*, has loaded at Crisfield, Md., with oysters to be carried to London. The *Salsette* is a ship of about 2,000 tuns, has been sent out by the Fishmongers' Company, of London, to procure oysters for replenishing the exhausted oyster-beds of England.

DOMESTIC WOOLENS.—The woolen mills of the United States have now upwards of $60,000,000 invested. The domestic product of wool last year was only one-half the quantity required to keep them running, consequently all not now idle, with some exceptions, are lessening their production.

PARAFFINE.—In 1871, the United States Government collected a revenue of ten cents on this article of commerce.

A FARMER at Cedar Rapids, Iowa, has a herd of nine elk that he is training and breaking into farm work.

Rock Salt.

GERMANY possesses very considerable deposits of rock salt, of which that of Stassfurt, near Magdeburg, has a thickness of above 1,000 feet, and it has gained besides a great reputation for the large masses of chloride of potassium which it contains in the upper strata. The adjoining rock-salt mine, Leopoldshall, in Anhalt-Dessau, raised in 1871 not less than 19,200 tuns English of potassium salt, and is expected to yield in future a clear revenue of £120,000 as a minimum. Another important discovery of rock salt was recently made by the Government at Inswraclaw in Prussian Poland, near a well-known hill composed of gypsum. The rock salt was found 413 feet below the surface, and has been bored through above 600 feet.

Too Much of a Good Thing.

THERE is an account in a San Francisco exchange of a safe which an ingenious mechanic constructed, and declared to be absolutely burglar-proof. To convince the incredulous of this fact, he placed a $1,000 bill in his pocket, had himself locked in the safe with an ample supply of provisions, declaring he would give the money to the man who unfastened the door. All the blacksmiths, and burglars, and carpenters in the State have been busy for a week, boring and blasting and beating at the safe, and the man is there yet. He has whispered through the key hole that he will make the reward $10,000 if somebody will only let him out. Fears are entertained that the whole concern will have to be melted down in a blast-furnace before he is released, and it is proposed to pass in through the key-hole a fireproof jacket to protect the inventor while the iron is melting.

A Curious Accident.

A CURIOUS accident, arising from the intense cold of December last, took place recently at the printing establishment of MM. Renou & Maulde, Paris. The engine employed is a horizontal 12-horse, placed in a glazed building. On the night of the 8th of December, the work having been knocked off towards two A.M., the engine was subjected, with but small protection, to the intense cold, which registered 5·8° below zero.

Towards eight o'clock on the morning of the 9th, the engineer, just before starting the engine, took the precaution to turn the fly-wheel by hand, to satisfy himself that the cylinder, which was well protected, contained no fragments of ice. Satisfied on this point, he thought he could without danger admit the steam, but on the first stroke of the piston, the frame, constructed of good quality iron, but contracted beyond measure, could not withstand the strain thrown upon it by the fly-wheel, and it broke into three fragments.

Old Narrow-gauge Lines.

THE anthracite mountains of Pennsylvania, have been traversed by narrow-gauge roads for more than thirty years. The Mauch Chunk road is a narrow gauge—three feet; the Nesquehoning railroad and the Carbondale railroad are narrow gauge. These were the first in the country, and were rapidly added to, all over that region, since about the year 1835. The Delaware & Hudson Canal Co., who own the road to Carbondale, imported the first locomotive used in this country. They have continued to use locomotives on their road—though it is in part gravity; and the amount of coal traffic done by them proves conclusively that a narrow gauge *will not limit a business, but rather facilitate it in the ease and rapidity with which it can be handled.* But few, if any, of the engineers who have been accustomed to these narrow gauges ever dispute their adaptability to be operated with locomotives, but some of them were built as gravity roads because the nature of the country demanded it; and it is no unusual thing to transport at the rate of 5,000 tuns of coal per day over one of them, or 10,000 tuns per twenty-four hours. And these roads do not cost to exceed one-half that of the broad gauges which run almost by their side, and not more than two-thirds as much to operate.—*Manufacturer's Gazette.*

Old Iron.

THE oldest pieces of wrought-iron now known are probably the sickle-blade found by Belzoni under the base of a sphynx in Karnak, the blade found by Colonel Vyse imbedded in the masonry of the great pyramid, and the portion of a cross-cut saw exhumed at Nimrood by Mr. Layard, all of which are now in the British Museum. A wrought bar of Damascus steel was presented by King Porus to Alexander the Great, and the razor steel of China for many centuries has surpassed all European steels in temper and durability of edge. It appears that the Hindoos wrought iron directly from the ore, without passing it through the stage of wrought-iron. Beautiful ornamented works of iron are still standing in India, which date from the early centuries of the Christian era.

The Brooklyn Bridge.

THE work on this structure is progressing much faster on the New York tower than it did on the Brooklyn one. On the New York tower there are now employed 250 men, of whom 200 are laborers. These are divided into gangs of 100 each. A gang goes down into the air-chamber and works four hours; then they have four hours' rest; then four hours' work again, and the day's work is finished, eight hours being the limit. The men have the assistance of twelve steam-engines, known as "compressors," to supply them with air; there are two engines for hoisting stone, two for hoisting mud and other *débris*, and two for sending down tools, materials, and for general use. The large suspending cables are not made by any wire manufacturing company. The wire will be purchased in bulk, and then the great cables, fourteen inches in diameter, will be made, the wire-rope being twisted up from the single wires in the position in which it is to remain.

Important Railway Decision.

AN important railway decision has received affirmation by the New York Court of Appeals. Dorathe Rawson sued the Pennsylvania Railroad Company to recover $4,000 for loss of baggage. In behalf of the defence, it was insisted that, as there was a condition printed on the ticket upon which the plaintiff was riding at the time of the loss, that the company would not be liable to exceed $100, she could not recover more than that sum. On the trial below the plaintiff obtained judgment for $4,000, and the Court of Appeals have affirmed that judgment. This decision maintains, as law, that the clause on railroad tickets limiting the loss to $100 for baggage does not so limit such loss. This is a decision of a long-mooted and frequently contested question.

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MODELS, SPECIMENS, ETC.

No models are required for design-patents, and in other cases it is left to the discretion of the Commissioner of Patents whether he will require a model; but in order to enable the model to be dispensed with, the drawings require to be very full and plain, and the specification to be prepared with great care and skill, and it will be more than ever necessary that the inventor should employ a thoroughly competent attorney. Messrs. BROWN, COOMBS & Co. will, whenever desired, and if it is possible to do so, obtain the permission of the Commissioner of Patents to dispense with a model. This, in many cases, will save the inventor much trouble and expense in obtaining the patent; but we recommend, as a general rule, that a model should accompany the application. Models, when required, must be neatly and substantially made of hard wood or metal—or if of soft-wood must be painted or varnished; they should not exceed one foot in any of their dimensions.

Applications for Patents on Compositions of Matter require to be accompanied by specimens of the ingredients and of the composition.

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One of the provisions of the new law is that for the protection of TRADE-MARKS by registration in the United States Patent Office. Heretofore, Trade-marks—except so far as particular designs could be patented—were only protected in a loose and uncertain manner by the State courts; but now the United States offers definite and certain protection for the term of thirty years, at a fee of $25. Messrs. BROWN, COOMBS & Co. obtain these protections upon the most reasonable terms, according to the nature of the case.

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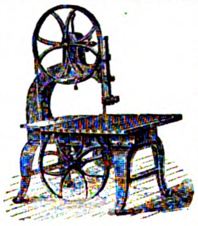

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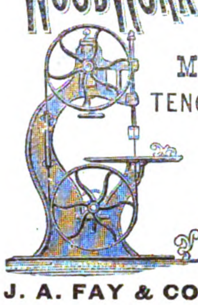

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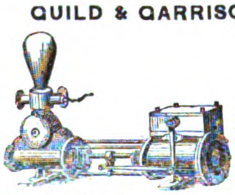

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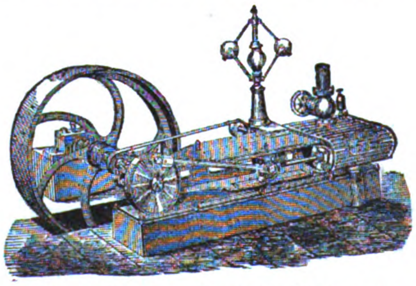

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None but ORIGINAL illustrations—preferably executed by our *own engravers*—will be published in the AMERICAN ARTISAN. Distant patentees desiring to have their inventions illustrated and described in our columns, should at once send us a small model of their machine, by express (prepaid); or mail a good photograph, together with their LETTERS-PATENT, to our address. We will then promptly examine the same, and return a reply, stating the precise expense of the engraving, the payment of which will be always required in *advance*. Address models, documents, etc., for the above object, as follows:—

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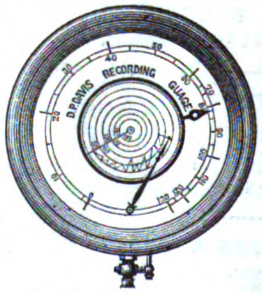

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RICHARD H. BUEL, CONSULTING MECHANical Engineer, 7 Warren Street, New York.—Professor R. H. Thurston, of the Stevens Institute of Technology, has consented to associate himself with me in consultation on matters of special importance. I have enjoyed considerable experience as an engineer officer in the U. S. Navy, in actual service afloat, as Principal Assistant to the Chief Engineer of the Norfolk Navy Yard, ahd as Assistant Professor of Natural and Experimental Philosophy at the U. S. Naval Academy. I have also been engaged in the management, erection, and repairs of saw mills and other machinery in the South; as Principal Assistant Engineer of Tehuantepec and Nicaragua Surveying expedition, and as Professor of Mathematics, *ad interim*, at the Stevens Institute of Technology. I have at command a large and varied assortment of instruments used in testing engines, boilers, and other machinery. Machinery on all kinds bought and sold. Advice and assistance given to those who desire to invest funds in meritorious and valuable Patent Rights. Special attention will be given to expert practice in legal cases. I have permission to refer to a number of gentlemen well known in professional circles.
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CONTENTS OF THIS NUMBER

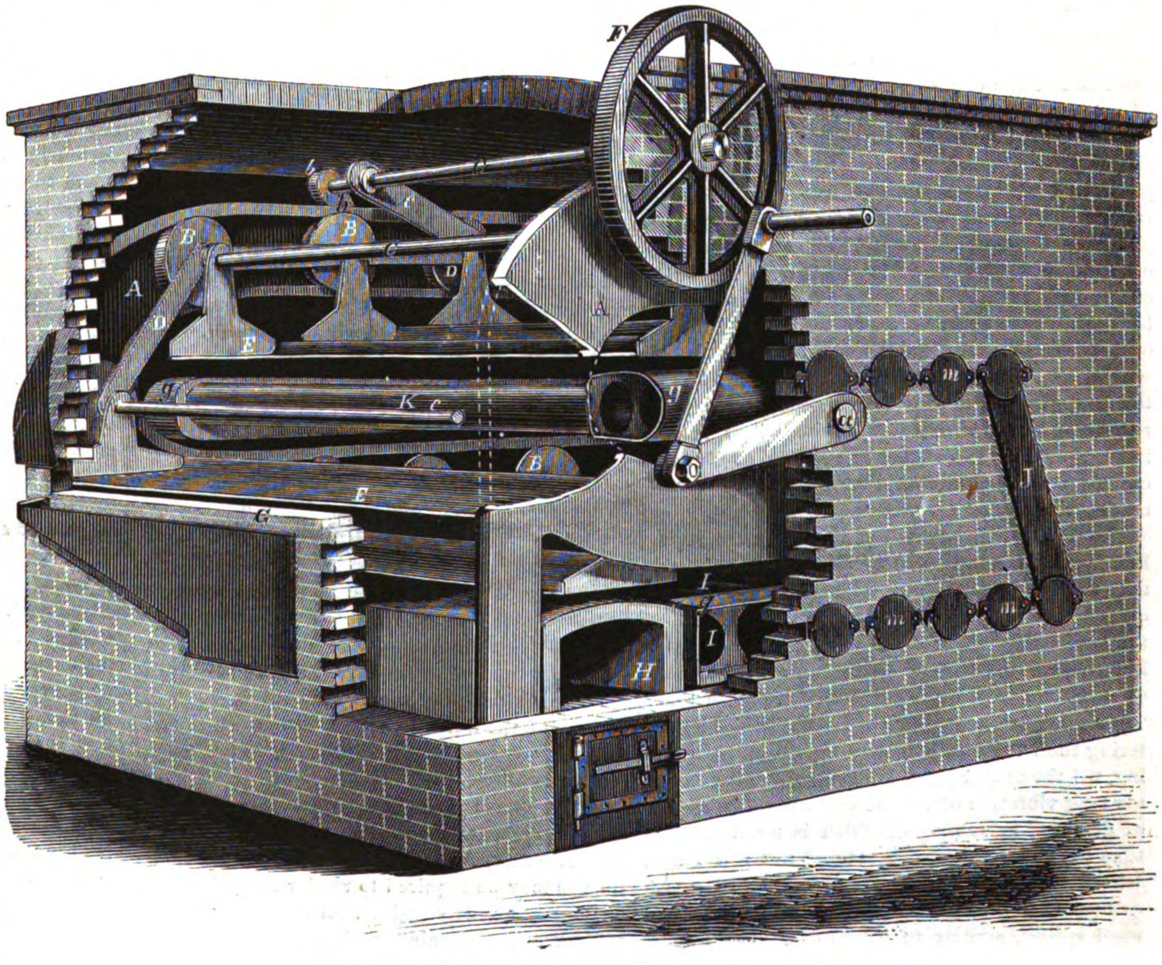
[Illustrations are indicated by an asterisk.]

Crumbie's Patent Perpetual Oven.

THE accompanying engraving illustrates an improved baker's oven of the class known as perpetual, in which the loaves, crackers, or other material to be baked, is caused to pass in a circuit through the oven in such manner as to be successively exposed to the heat in all parts thereof. One great advantage of this variety of ovens, aside from their manifest convenience, is that all the loaves, or equivalents thereof, are subjected to the same degrees of heat, and a uniform quality, as far as baking is concerned, is secured in the whole of the baked product. The engraving is a perspective view of the improved oven, a portion of one end and side being represented as broken away to show the internal parts. The inventor is Alexander Crumbie, of Jersey City, N. J. An application for a patent, through the "American Artisan Patent Agency," is now pending.

The brickwork of the oven does not differ in any material degree from those of ordinary construction, and has properly fixed internally at each side an endless metallic guide, A. The upper and lower, or longitudinal, portions of these guides are straight, and the end portions curved or semicircular. In the guides, A, traverse the rollers, B, connected by transverse axles, C, each pair of rollers with the axle thereof being kept at a suitable distance from those adjacent by the bars, D. From each axle is suspended a shelf, E, capable of a swinging movement thereon, so that when the system of shelf-supporting devices just described is operated by the travel of the rollers, B, in the guides, A, the shelves, by their own gravity, will be constantly maintained in a horizontal position. To provide the requisite movement to the shelf-carrying system, a transverse rock-shaft, *a*, is provided with arms, *b*, carrying-pawls, *c*, arranged to give an intermittent rotary motion to the system when actuated by a pitman connecting the driving or crank pulley, F, with the lever-arm, *d*, and rock-shaft, *a*. It will thus be seen that the shelves will be brought in succession to the front door or opening at G. During the intervals afforded by the intermittent movement of the apparatus, the loaves, baked by their passage through the oven, may be removed and replaced by unbaked loaves, the operation being thus kept up continuously as long as may be required.

The fire-box, H, of the oven is situated at its front end, and communicates with a horizontal serpentine series of flues, I, which at the rear connect by an upright flue, J, with an upper series of similar serpentine flues, K, which pass between the upper and lower portions of the system of shelf-carrying devices, as fully shown in the engraving. This upper series connects direct with the chimney or uptake. By this arrangement of the heating flues with reference to the shelves which carry the loaves, a very efficient distribution of the heat is obtained. Each series of serpentine flues is formed by straight transverse flues or sections, the ends of which are let into two side or longitudinal sections, *g*, provided transversely with partitions in such manner as to divert the gaseous products of combustion alternately in opposite directions, from one to another of the cross sections as they pass from the fire-box. Through one side of the brickwork, and also through the coincident part of the adjacent longitudinal section, *g*, are openings arranged directly opposite the ends of the cross sections of both series of serpentine flues. These openings are furnished with metal covers, *m*, pivoted to the outer side of the brickwork, and so arranged as to be opened at will. By lifting these covers, on occasion, cold air is permitted to enter the flues and to circulate through the same, thereby gradually reducing the temperature within the oven without any sudden or preliminary increase, such as necessarily follows when, as is the custom with ordinary bakers' ovens, the door of the fire-box is opened



CRUMBIE'S PATENT PERPETUAL OVEN.

to diminish the draught, but which at first produces increased combustion from the sudden inlet of a large quantity of air.

Music Boxes.

MECHANICAL music seems to have kept pace with the onward march of all the other arts, and the perfection of the music boxes of to-day is only excelled by the elegance with which they are incased. Few people have any correct idea of the present demand for this class of merchandise, nor of the value of some of these beautiful machines, nor of the exquisite musical effects that are produced by the introduction of reeds, pipes, etc., in combination with the tones proper of the musical box; much less have the general public or the trade any correct idea of the mechanical methods of their construction, which has kept pace with increased demand.

The origin of musical boxes dates back to considerable antiquity, but, being one of those arts which arrive at perfection only by slow growth, the precise date of their invention, or even of introduction, cannot be fixed at any precise time. Among the earliest forms which this species of mechanism assumed was that of a charm or seal, pendent from a watch-chain, and from that small beginning has grown the whole art of mechanical music, embracing every grade and quality, from the tiny charm to the grand orchestrion, and ranging in price from $3 to $3,000, and varying in the number of tunes performed from one to over one hundred.

In the music box, the rapidity of the successive notes is very great, and it is impossible to make one tooth of the comb make the requisite number of notes in succession without striking upon the following pin; therefore, there are two, three, or four teeth of the comb having the same tone or pitch, and placed contiguous, which allows the rapid recurrence of the same note by placing the pins side by side, following, instead of behind each other. The time in which the cylinder makes its revolution should be the same as would be required to execute the same piece by any other method, and depends upon the train of wheels and pinions leading to the "fly." In all the larger and more pretentious music boxes, this regulator or fly is adjustable; the wings which impinge against the air being capable of limited extension and contraction, thus retarding or accelerating the rate of revolution of the cylinder.

The tones of these teeth of the comb are regulated by their length and thickness; the shorter they are, the quicker the vibrations, and consequently the higher in the scale is the pitch. To the long teeth, which are to vibrate slowly for the low notes of the scale, are attached masses of lead of sufficient weight to give the requisite tone. The tuning of these teeth is accomplished by altering their thickness by stoning, filing, or scraping, till the proper pitch is obtained. To prevent too long vibration of any of these teeth, a system of dampers is employed, which is nothing more than fixing on the under side of the low notes, whose vibrations are long and strong in consequence of the weight they carry, small pieces of steel spring, similar to pieces of a watch hair-spring, pinned into small holes drilled for the purpose; to the middle teeth of the comb small bits of goose-quill are attached by cement, the short teeth, having a short vibration, requiring no dampers; these little dampers extend nearly to the point of the tooth, not touching it, but contiguous, so that the pin which is about to lift the tooth first presses upon the damper, forcing it up against the tooth, and for the purpose of preventing further vibrations of the tooth until the pin has passed. The disagreeable jingling sounds which are so often unpleasantly prevalent in inferior musical boxes, are mainly due to the absence or improper adjustment of these little dampers.

Iron Boats for the Mississippi.

MESSRS. CHAPMAN & THORP, of St. Louis, among the most extensive lumber dealers in the country, contracted a few days since with parties in Dubuque, Iowa, for a hull of the following dimensions:—Hull, 145 feet; breadth of beam, 26 feet; depth, 4½ feet. The entire hull is to be of iron, including deck and guards. The hull will be divided into eight water-tight compartments. There will be tanks in it, by which it will be practicable to sink the boat to the draught required in five minutes, or in about the same time to raise her to her original draught of water. The contract requires that she shall draw but eighteen inches water when completed, with water and twenty-four hours' fuel on board. In short, she is to be a regular Clyde-built iron vessel. No rivets will be seen; on the contrary, the exterior of the hull will present a perfectly even and smooth surface. Mr. Hopkins, a practical builder from the Clyde, Scotland, will superintend the construction. He built the iron steamer *Clyde* recently at Dubuque, and also an iron barge. The power is to be equal to 20 by 30 inch cylinders, to propel Dowler & Birdseye's shoal-water propeller, which is the invention of Capt. John Dowler, an Illinois River steamboat man. The one under contract is to be able to tow up stream two thousand five hundred tuns weight at a speed of 4½ to 5 miles per hour. She will have a full "texas," with business office, and rooms for the employees of the company. It is to be completed by May 1 of this year, and delivered in St. Louis completed. The same parties will soon begin the construction of two other iron steamboat hulls for the same firm, one larger and one smaller than the one now building, and all to be furnished with the shoal-water propeller aforesaid. They will be fully employed in the upper Mississippi during navigation in towing rafts. When navigation is suspended, they will tow in the lower river. Bids for these hulls, or one of them, were received from St. Louis and Dubuque.—*St. Louis Democrat.*

Restoring Charred Manuscript.

THE wholesale destruction by the fire in Chicago of the receptacles used for the safe-keeping of valuable written and printed documents has called for some means of restoring burnt manuscript and the like, at least so far as to permit the same to be deciphered. A resident, Mr. J. V. L. Blaney, of the burned city, has attempted to meet the necessity by a patented process, which he describes as follows:—

"The charred paper is to be first separated into single leaves, and then immersed in a solution of a soluble compound of silver or copper for such a time as may be required to render the printing or writing sufficiently legible. A solution of the nitrate of silver containing forty grains of that salt to one fluid ounce of distilled water is preferred. If the restoration is only required to be made on one side of the sheet, the solution may be applied with a brush, or by floating the paper upon the surface of the liquid.

"The process succeeds best in a dark or a feebly lighted room. After sufficient legibility has been attained, the paper should be soaked for some time in pure water to remove the excess of the salt used—in the case of silver salts, a dilute solution of hyposulphite of soda or of cyanide of potassium may be used—after which the paper may be exposed to the light, and, when dry, covered with a transparent mucilage or varnish for preservation."

Steam on Canals.

THE Canal (N. Y.) Commissioners report that they have received over 700 communications from all parts of the world in reference to power on canals; many models have been sent, some being the productions of women; some are valuable, but many are results of inexperience or are visionary. The Commission does not advise any change in the law of the kind desired by such persons as think its objects cannot be secured as it now stands and is construed by the Attorney-General. On the contrary, the Commission is of opinion that compliance with all the present requisitions of the law should be insisted upon before the money should be awarded. All the time allowed by the law will be given to the competitors; but the Commission will adhere to the determination expressed at its first meeting, that boats in actual service, and not drawings or models, will be considered as competing for the money offered by the State. The engineer's report is very elaborate, and will be submitted to the Legislature.—*Tribune.*

Amorphous Silica as a Mordant for Colors.

SILICA as obtained by precipitating the silicate of soda with an acid, withdraws substantive colors from their solutions. With the aid of a mordant it combines also with adjective colors very much like an organic fiber, and holds them as tenaciously as cotton. Its affinity for the coal-tar colors is remarkable. If recently precipitated and well-washed silica is put into glasses containing solutions of magenta, or of the aniline violets or blues, the precipitate seizes upon the color, and retains it on washing with water. Boiling water or alcohol withdraws the color from the silica. The powdery colors thus obtained can be used in painting and paper-staining. Aniline colors can also be fixed upon cotton by the aid of silica. If impregnated with silica or with an easily decomposible silica compound, the cotton takes aniline colors readily. This may be effected by rinsing the cotton goods in a solution of the silicate of soda. It is better, however, to fix the silica in the fiber by first working in the silicate of soda, and then passing the goods through a dilute acid. The cotton is then well washed and worked in a solution of the dye. In this manner the dulness is avoided which never fails to appear whenever aniline colors are fixed upon cotton by the aid of gall-nuts, myrabolans, or any other substance containing tannin. The aniline shades fixed upon cotton by means of silica are remarkably solid, and resist alkalies and soap-lyes better than those obtained on the ordinary plan. Silica is also useful for fixing the aniline greens upon woolens. The goods are worked in silicate of soda, dyed at a hand-heat in a solution of aniline green, and passed through a bath of dilute acid.—*Exchange.*

Circulars Wanted.

MR. WM. F. DODGE, editor of the *Manufacturers' Record*, Newark, N. J., desires manufacturers in every department of industry to send him price-lists, etc., of their products.

The Steam-jacket.

Two principal arguments have been and are frequently urged against the use of the steam-jacket. One is that the radiating surface is increased, and therefore more heat is transmitted to the atmosphere. The other and more important objection is, that the condensation which without the jacket would take place in the cylinder, occurs in the jacket, and therefore represents just as much loss of fuel. As regards the first point, even on the showing of an opponent of the system, the loss by radiation in an unclothed cylinder would not exceed one 137th part of the whole heat passing through the cylinder. This loss would be increased by about 63 per cent. by the addition of an unclothed jacket. Whichever estimate we take, the loss is comparatively small. It may be shown, indeed, that the entire loss from external radiation is in well-clothed engines, whether jacketed or not, less than one per cent. of the whole heat passing through the cylinder. Under the circumstances, we may neglect the loss of heat from this source altogether.

Let us see, now, what force is to be attached to the argument that steam is condensed in the jacket instead of in the cylinder, and that, as a consequence, nothing is gained by the jacket. It is quite indisputable that steam is condensed in the jacket, and every engineer who has had charge of well-jacketed engines, also knows by experience that no steam, or but the most trifling quantity, is condensed in the cylinder. We think our correspondent and those whom he represents will admit these facts without question. The point at issue is then narrowed to this:—Is less, or as much, or more, steam condensed in the jacket than would have been condensed in the cylinder had it been unjacketed? On the answer which can be given to this question hangs the utility of the jacket. If it can be proved that as much, or even nearly as much, steam is condensed to waste in it as would have been condensed in the cylinder, then it is of no use whatever. It is simply an expensive and burdensome addition to any engine. Now, it unfortunately happens that few reliable experiments have been conducted to determine the precise quantity of water condensed in the jacket of a given engine under given conditions of work. We have never had the opportunity afforded us of properly investigating the matter ourselves, nor are we acquainted with a single engineer who has. We may search the writings of the most eminent authorities on the steam-engine without avail for practical information on the point. Of course, the quantity may be approximately arrived at by theoretical calculation, but there are so many elements of uncertainty unavoidably ruling such a calculation that we attach little value to results so obtained. In the absence of the requisite positive data, then, we must turn in another direction in search of what we want. The information which has been obtained during the practice of years by most large engineering firms is definitely to the effect that, without the jacket, steam cannot be worked expansively with economy. Theoretical investigations, on the other hand, show that as much water cannot be condensed to waste in the jacket as would have been condensed in the cylinder if it had been unjacketed. These calculations will not show, for reasons we have already stated, how much the rate of condensation is reduced, but they show that it is reduced, and as theory and practice here go together, it may be assumed that the efficiency of the steam-jacket is really unimpeachable. We shall confine ourselves to trying once more to put in the plainest possible terms the theory of its action.

We shall begin by laying down two very simple propositions. The first is that loss of useful effect —friction excepted—can only arise in any steam-engine from one cause—condensation of steam which has done no work. The second is, that no loss of useful effect follows on the condensation of steam effected by work. These two propositions lie at the root of every question connected with the action of steam in a cylinder. . . . It is too commonly assumed by engineers who ought to know better, that steam can only be condensed, liquefied, turned into water again, by the application of cold. The fact is, however, that, if we could convert all the heat stored up in steam into work, the steam would return to its pristine condition as water without the application of cold, and we should obtain one indicated horse-power for somewhere about 2 ounces of coal burned per hour. The better an engine is, the greater is the quantity of heat taken out of the steam in the form of work, and represented by the amount of liquefaction which takes place in the cylinder. When the indicated power is known, it is a simple matter to calculate the quantity of steam liquefied per stroke in the cylinder. Without going into details here, it will suffice to say that, in fairly good engines working expansively, it amounts to 7 or 8 per cent. of the whole weight of steam passing through the engine. It thus exceeds by about ten times the condensation which could be produced as an effect of external radiation, by our correspondent's calculations.

Now, according to our second proposition given above, this condensation or liquefaction, to use the more distinctive term, does not present a loss. We get in return the whole useful effect of the engine. Without this liquefaction, indeed, we should have no work done, and its percentage amount shows the percentage efficiency of the engine as compared with theoretical perfection. The greater the liquefaction, the more perfect is the engine. The liquefied steam assumes the form of spray or mist, and if suffered to remain in the cylinder it operates for evil in two ways. In the first place, part of it settles on the surface of the metal if that surface is in the least degree colder than the steam. As the pressure falls it is re-evaporated, and passes off to the condenser during the whole time the exhaust port is open. In doing this it absorbs heat from the cylinder; but heat is another term for work, and instead of restoring this heat as work on the piston, the re evaporated water simply carries it to the condenser, and performs the work there in heating injection or circulating water. At the next admission of steam the cylinder has to be warmed up again, to no end but the transmission of heat during the return stroke to the condenser. So much for part of the liquefied steam. The remainder, hanging in mist in the unliquefied steam, converts that which was a bad conductor and absorber of heat into one of the best known conductors, and so facilitates to an enormous extent the transmission of heat from the cylinder to the condenser.

These facts understood, we are in a position to consider the action of the steam-jacket. No clothing which could be put upon a cylinder will prevent the liquefaction of steam doing work. We must, to avoid that, impart as much heat to the steam as it loses in performing its task; *and this is precisely what the jacket does.* The whole theory of its action may be summed up in the following words:—All the liquefaction due to the performance of work by the steam within the cylinder is transferred to the steam within the jacket. The water resulting from this liquefaction is restored to the boiler, where it is re-evaporated, and flows to the cylinder to do more work; whereas, if the liquefaction had taken place within the cylinder, the resulting water would have been re-evaporated there instead of within the boiler, and the resulting steam, although obtained at just the same expenditure of power, would, instead of doing work on the piston, do it in heating the condensing water. It thus appears that, in a properly jacketed engine, *the true seat of the entire energy of the engine is in the jacket, and not in the cylinder*, and, startling as the statement may appear at first sight, it is none the less virtually true that it is *in the jacket, and not in the cylinder, that all the work of the steam is performed.* It follows as a consequence, that the condensation which takes place in the jacket does not in any way represent loss of fuel, except in so far as that condensation is a result of radiation and conduction through the sides of the cylinder to the condenser, during the time the exhaust port is open, and of radiation to the external atmosphere.

We have purposely omitted all particular reference to the effect of the jacket on indicator diagrams, or its effects in bringing about the re-evaporation of water deposited on the surface of the cylinder. We have endeavored to deal with principles only, and, when once they are mastered, our readers will have no difficulty in understanding the effect of various other sources of loss—partly telling on the steam in the jacket, partly on that in the cylinder. The jacket, we may add in conclusion, is to the full as elegant a device as the separate condenser; and, when applied in the best possible manner, it is as capable of transferring the performance of all the work done to itself, as the condenser is of taking the work of condensation to itself. In other words, an unjacketed engine bears very nearly the same relation to a jacketed engine that the first machines of Newcomen or Smeaton did to the best engines Watt ever built.—*The Engineer.*

Patent Fuel.

"Take three parts of the best Newcastle coal, beaten small, one part of loame, mix these well together into a masse with water, make thereof balls, which you must dry very well. This fire is durable, sweet, not offensive by reason of the smoke or cinder as other coal fires are, beautiful in shape, and not so costly as other fire, burns as well in a chamber even as charcoal." The foregoing extract, taken from a fragment of an old book supposed to have been printed about the year 1670 or 1679, and headed "An Excellent Invention to make a Fire," contains probably the earliest reference on record to the manufacture of what is now commonly known as artificial or patent fuel. At that date, however, very different reasons existed for preferring such a fuel to coal in its natural state, to those which now prevail, as an inducement to its manufacture. When coal was first introduced into London, the greatest possible objections were raised against it, and the manufacture of the compound fuel above described is evidence of the strong prejudice then entertained to the use of coal.—*English Paper.*

A combination wood and iron telegraph pole is now suggested. A standard socket receives the lower end of a pole, which is secured by a wedge, and bituminous material run in for securely holding it.

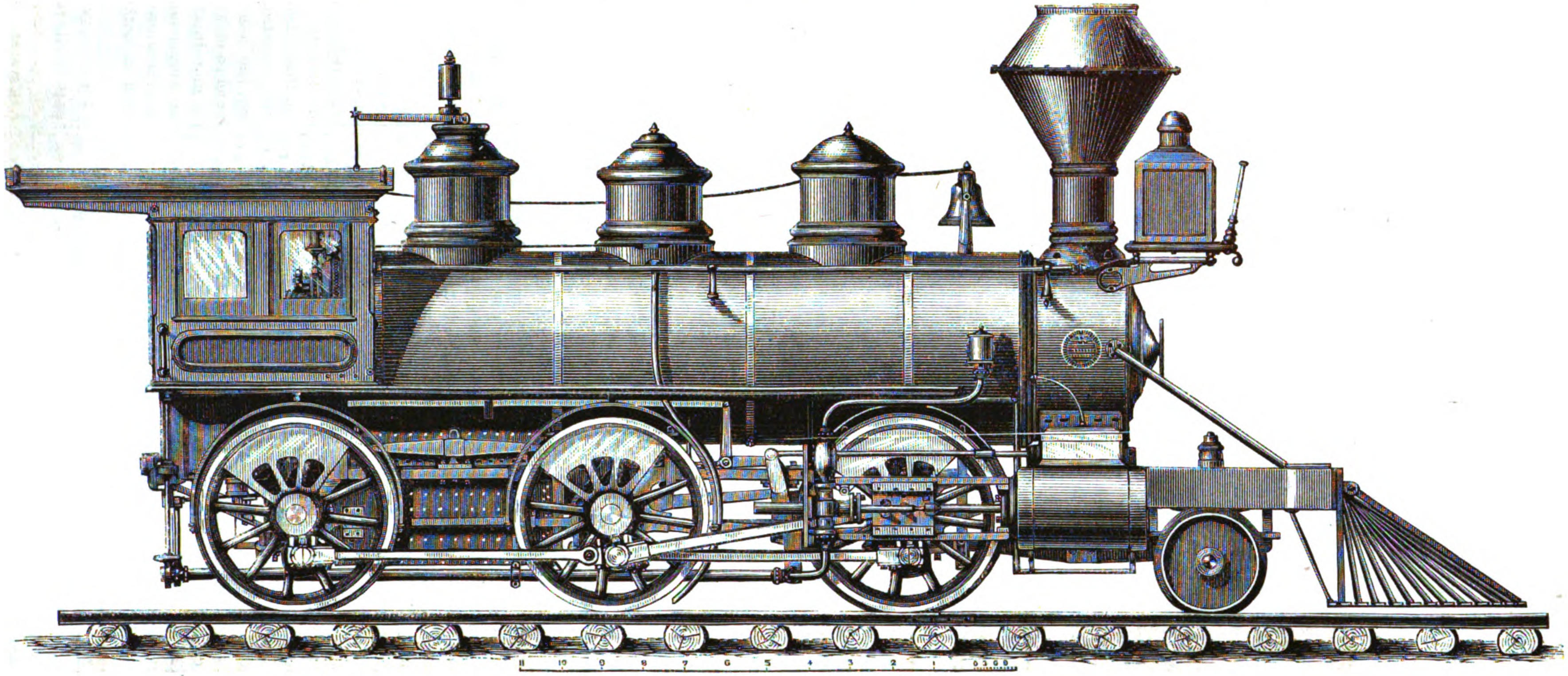
"Mogul" Freight Locomotive.

WE take from the *Railroad Gazette* the engravings and specification herewith presented of a locomotive built by the Baldwin (Philadelphia) Locomotive-works, and of a type now being to some extent substituted for the ordinary freight locomotive with four drivers and a truck. The general arrangement of the parts is sufficiently intelligible from the illustrations, and the dimensions in detail are set forth as follows:—

The specification is of an eight-wheeled "mogul" freight locomotive engine, having six coupled wheels and a swing-bolster pony truck. In it the cylinders are 17 inches diameter and 24 inches stroke. Drivers, 54¼ inches diameter. Gauge, 4 feet 9 inches. Fuel, soft coal or wood. Weight of engine in working order with fuel and water, about 70,000 pounds; 60,000 pounds on drivers. Total wheel-base, 21 feet 10 inches. Rigid wheel-base, 14 feet 6 inches. The boiler is of the best Pennsylvania cold-blast charcoal iron, ⅜ inch thick; all horizontal seams and junction of waist and fire-box double riveted. Boiler to be well and thoroughly stayed in all its parts, provided with cleaning-holes, etc. Waist 50 inches in diameter at smoke-box end; made straight and with two domes. Flues of iron, with copper ferrules on fire-box end, 156 in number, 2 inches in diameter, and 11 feet 3 inches in length.

Fire-box, 60 inches long and 34½ inches wide inside, of best homogeneous cast-steel; side, crown, and back sheets, 5-16ths inch thick; flue-sheet, ½ inch thick. Water-space, 3 inches sides and back, 4 inches front. Stay-bolts, 7-8ths inch diameter, screwed and riveted to sheets, and not over 4½ inches from center to center. Crown-bars made of two pieces of iron 4½ inches by 5-8th inch, bearing on side sheets, placed not over 4½ inches from center to center, and secured by bolts screwed through crown, with nut on, and riveted over. Grates, cast-iron, ash-pan, with double dampers. Smoke-stack, diamond pattern.

The cylinders are placed horizontally; each cylinder cast in one piece with half-saddle; right and left-hand cylinders reversible and interchangeable; accurately planed, fitted and bolted together in the most approved manner. The pistons are fitted with two brass rings babbitted, while the guides are of iron, case-hardened, fitted to guide-yoke, extending across. The valve motion is of the most approved, shifting-link motion, graduated to cut off equally at all points of the stroke. Links made of the best hammered iron, well case-hardened. Sliding block, 4½ inches long, with flanges 7 inches long. Rock-shafts of wrought-iron, with journals 3½ inches diameter and 12 inches long. Reversed shaft made with arms forged on. The driving-wheels are six in number, 54½ inches in diameter. Centers of cast-iron, with hollow spokes and rims, and turned to 49½ inches diameter to receive tires.



"MOGUL" FREIGHT LOCOMOTIVE.

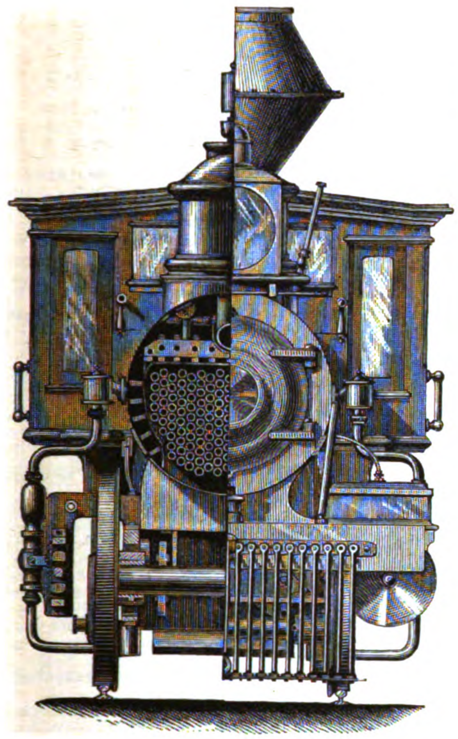
Tires of cast-steel, front and back pair flanged, 5½ inches wide and 2⅜ inches thick when finished. Main pair plain, 6 inches wide and 2⅜ inches thick. Axles of hammered iron; journals 7 inches diameter and 8 inches long. Wrist-pins of cast-steel. Springs of best quality of cast-steel. Connecting-rods of best hammered iron, furnished with all necessary straps, keys, and brasses, well fitted and finished. Equalizing beams of most approved arrangement, with steel bearings.

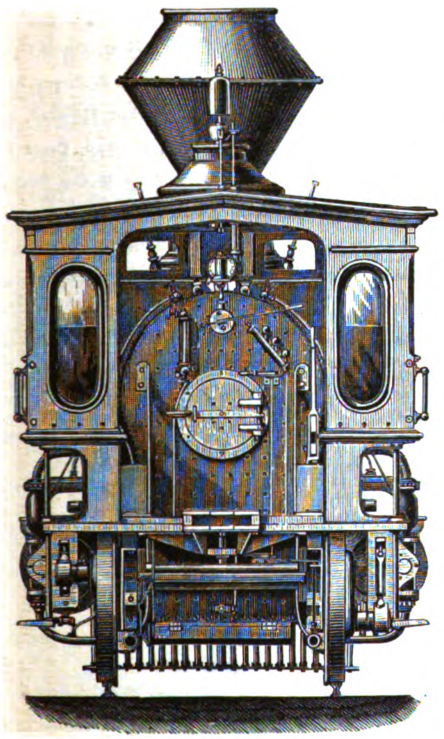
The frames are of hammered iron. Pedestals and braces bolted. Pedestals cased with cast-iron gibs and wedges to prevent wear by boxes, and keyed to place. The feed-water is supplied by one injector and two pumps, with valves and cages of best hard metal accurately fitted. Plunger of iron. Cock in feed-pipe regulated from foot-board. The engine truck has the frame square wrought-iron, with center-bearing swinging-bolster and radius bar. Wheels of approved pattern, 30 inches diameter. Axles of best hammered iron, with inside journals 4½ inches diameter and 8 inches long. Springs of cast-steel connected by equalizing beams. The house of good pattern, substantially built of hard wood, well finished and fitted to place, and the pilot of wood. The engine is furnished with sand-box, alarm and signal bells, whistle, two safety-valves, steam and water-gauges, heater and gauge-cocks, oil-cans, etc., etc. Also, a complete set of tools, consisting of two jack-screws, pinch-bar, monkey, packing, and flat wrenches, hammer, chisels, etc.

As concerns finish, the cylinders are lagged with wood and neatly cased with brass heads of cast-iron polished. Steam-chests with cast-iron tops; bodies cased with brass. Domes lagged with

wood, with brass casing on bodies and cast-iron top and bottom rings. Boiler lagged with wood, and neatly jacketed with Russia iron, secured by brass bands polished.

All principal parts of engine are accurately fitted to gauges and thoroughly interchangeable. All movable bolts and nuts and all wearing surfaces made of steel or iron, case-hardened. All wearing brasses made of ingot copper and tin, alloyed in the proportion of seven parts of the former to one of the latter.





The tender is on eight wheels, 30 inches diameter; axles of best hammered iron; outside journals, 3¼ diameter and 5½ inches long; oil-tight boxes with brass bearing. Springs of cast-steel equalized. Tank well put together with angle-iron corners and strongly braced. Top and bottom plates of No. 6 iron; side-plates of No. 8 iron. Capacity, 2,000 gallons.

Modus Operandi of Coal-mining.

COAL is usually mined by one of three methods, according to the location of the vein worked, and the direction to be taken in following it. When coal lies in sloping or upturned veins on a hillside, few difficulties are encountered in getting it out. If it can be reached from the surface, a "drift" or "gangway" is cut in such a position that the water will drain off without pumping; if this is impracticable, a horizontal tunnel is cut, and when the vein is reached gangways are projected to the right and left, following the seam. Along these gangways tracks are laid, and all the coal lying above falls into the cars when loosened by blasting, and is drawn out by mules—thus obviating any expense for handling, and rendering this method the most economical of any. In the Lehigh and Schuylkill regions most of the mining operations are conducted on this plan, and it has also been found practicable in some instances, though not as the rule, in the Lackawanna district. In this and the Wyoming district the coal is chiefly reached by means of "slopes." The rich veins of coal underlying the whole country "crop out" at convenient points along the base of the mountains, and tunnels are bored into the coal, which necessarily incline downward at angles more or less abrupt, according to circumstances. In such mines it is necessary to draw out the loaded cars by means of hoisting machinery, and powerful steam-pumps are necessary to prevent the otherwise inevitable accumulation of water at the bottom. In other respects, the coal worked by this method is taken out in the same way as that before described—the slope being extended section by section until the vein is exhausted. The mine is then "robbed" by the removal of the columns originally left to support the roof, each of which contains several hundred tuns of coal, and the vein is abandoned. The most costly method of mining is by means of shafts, which is only resorted to when the coal cannot be reached except by striking perpendicularly downward from the surface, as is the case in most parts of the Lackawanna district, and, to some extent, the Wyoming. In these districts much of the coal lies in layers or strata at a greater or less depth, and shafts are sunk until the coal is reached, when gangways are projected horizontally in every direction that will pay for the working. The coal is then lifted to the surface by means of hoisting machinery, and, without other handling, is usually carried up to the top of the breaker. One shaft is now being sunk near Wilkesbarre, to tap what is known as the Ballemon vein, which will probably go down from 750 to 800 feet before the vein is reached.

In shaft-mining operations the coal requires no handling after it is loaded in cars along the gangways. Over the mouth of the pit a building is erected containing the breakers. When a car is filled at one of the breasts, it is drawn along the gangway by mule power to the bottom of the shaft and run on the elevator. At a signal from below the machinery is started in motion, and the car is raised to the top of the breaker and dumped—the lumps of coal passing between ponderous rolls armed with formidable iron teeth, which crush them into small fragments. Passing from between the rolls the coal falls out into large revolving cylindrical sieves. The meshes of the first sieve are so small that only the smaller sizes pass through it, the larger lumps rolling on to the next sieve, which takes the second size, and so on until the largest size rolls out at the end of the last sieve. The only hand-work required in preparing coal for market consists in picking out the slate from among the lumps that fall from the sieves into the troughs that conduct it to the cars beneath. This work is generally performed by children, and it is a curious sight to see the little boys seated in long rows, so covered with coal dust as to be scarcely recognizable as human beings, snatching up fragments of slate as the coal slips along under them in its downward course. As we have shown, each size is sifted into a separate trough, down which it slides by gravity until the gate at the bottom is reached. When cars are to be filled, they are placed in position and these gates are raised, allowing the coal to fall in and distribute itself without any handling. Every means is adopted to save labor, and the machinery of mining and transportation is so complete that the coal receives little or no handling from the time it is loaded upon cars in the subterranean gangways until it reaches market.

The shafts of the different companies mining by this method very closely resemble each other, and while a descent into one or two is interesting, one need not repeat the experiment too often, or he will find it rather more tedious than pleasant. Stepping upon the elevator, you are slowly dropped to the bottom, and find yourself in the midst of a system of branching tunnels, many of which are so straight and extend so far that the faint glimmer of lights may often be seen at a distance of six or seven hundred feet. Each miner carries a small oil lamp in the front of his hat, which serves to make the surrounding darkness doubly dark; but without other illumination the breasts are worked, the coal loaded upon cars, and the whole process of mining conducted. The largest yield from any single colliery in the vicinity is about 1,100 tuns per day, the average of all the mines being about 700 tuns per day each. Within the past few years great improvements have been made in the machinery of mining, and, were it not for the enormous waste, it might be doubted if further improvements were practicable without necessitating a total change in the system. As it is, however, the waste of coal-mining averages nearly, if not quite, 33⅓ per cent. of what is taken out of the mines. A great deal is lost in drilling and blasting at the breasts, but a great deal more is lost in the process of crushing the lumps in the breakers and loading it into cars. It is not known that much, if any, of this waste can be prevented, but one has but to observe the mountains of coal dust growing up on all sides about the mouths of the pits to realize that a vast amount of labor has thus been lost, and a vast amount of valuable fuel destroyed. It would be very costly to separate the coal from the slate and dirt that is mixed with and through it, and if this were done it would be found that from long exposure to the weather it had lost much in quality. Another difficulty is found in making it up into blocks that will not crumble in the fire, and inventing a process of manufacturing the dust fuel that shall be cheap enough to leave a profit on the price for which it could be marketed.—*Iron Age.*

FIRE-ENGINE.—In a foreign fire-engine it is proposed to utilize the box on the top for carrying the hose and also forming the reservoir to be filled with water. Also, in the employment of a double-cased vessel for impregnating water with carbonic acid, and in providing against the bursting of hose-pipe by internally dividing the branch-pipe into two compartments.

OFFICIAL LIST OF PATENTS

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For the Week ending February 20, 1872,

AND EACH BEARING THAT DATE.

[Reported officially for the "American Artisan."]

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123,758.—CORN-SHELLER.—Augustus Adams, Sandwich, Ill.

123,759.—BOOT-JACK.—Thomas Anthony, Providence, R. I., assignor to Benjamin F. Knowles, Manchester, Conn.

123,760.—PROCESS FOR MATURING AND CURING GREEN LEAF-TOBACCO.—John Ashcroft, assignor to Sarah Jane Ashcroft, Brooklyn, N. Y.

123,761.—ELEVATOR.—Cyrus W. Baldwin, assignor to Charles Whittier and Henry H. McBurney, Boston, Mass.

123,762.—DUMPING-CAR.—Charles Barrett, Boston, Mass.

123,763.—RIVETING MACHINE.—James Berry, assignor to himself and Henry Berry, Buffalo, N. Y.

123,764.—VALVE FOR DIRECT-ACTING ENGINES.—George F. Blake, Boston, Mass.

123,765.—VALVE FOR DIRECT-ACTING ENGINES.—George F. Blake, Boston, Mass. Ante-dated Feb. 15, 1872.

123,766.—STEAM-PUMP.—George F. Blake, Boston, Mass.

123,767.—STEAM-HEATER BOILER.—Francis Brackney, Baltimore, Md.

123,768.—METHOD OF DRYING NAPPED CLOTH.—Warren Chapin, Staffordsville, Conn.

123,769.—WHIP-SOCKET.—Lucas C. Clark, Plantsville, Conn. Ante-dated Feb. 5, 1872.

123,770.—RAILROAD-CAR VENTILATOR.—William G. Creamer, Brooklyn, N. Y.

123,771.—SELF-ACTING WATER-VALVE.—Jacob N. Deck, Buffalo, N. Y. Ante-dated Feb. 17, 1872.

123,772.—THREAD-CUTTER FOR SEWING-MACHINES.—George H. Dimond, Bridgeport, Conn.

123,773.—MACHINE FOR MANUFACTURING SUGAR-PLUMS.—Eugène Dufour and François Couppé, Chartres, France.

123,774.—HORSE-POWER.—Luther R. Faught, Philadelphia, Pa.

123,775.—SEWING-MACHINE TREADLE.—Charles A. Foster, Providence, R. I.

123,776.—COUPLING FOR STEAM OR AIR BRAKES.—Samuel N. Goodale, St. Louis, Mo.

123,777.—BRICK-MACHINE TRUCK.—Francis L. Hall, Oneida, N. Y.

123,778.—HAIR-CURLING PIN.—John Hall, Watertown, Mass. Ante-dated Feb. 5, 1872.

123,779.—ANIMAL-TRAP.—James M. Hill, Cisne, Ill.

123,780.—EARTH-CLOSET.—Amos A. Jaqua, New York City.

123,781.—COFFIN FROM PAPER OR OTHER PULP.—Franklin Keenan, Brownville, N. Y.

123,782.—FIGURE-TINTED PAPER.—George La Monte and George G. Saxe, New York City.

123,783.—FIRE-EXTINGUISHER.—Charles L. Levey, New York City, assignor to James E. Thompson, Buffalo, N. Y.

123,784.—LIFTING-JACK.—Carson A. Masterson, Decatur, Ill.

123,785.—MACHINE FOR BURNISHING BOOT AND SHOE-HEELS.—Alexander C. McKnight, Philadelphia, Pa.

123,786.—BORING-TOOL.—George W. Moore, Harrisburg, Pa.

123,787.—MANUFACTURE OF METAL-COATED SHEET-IRON.—Benjamin Morison, Philadelphia, Pa.

123,788.—RUFFLING-ATTACHMENT FOR SEWING-MACHINES.—Herman Moscuc witz, New York City.

123,789.—BUSH FOR FAUCETS.—Otto Netzow and John F. Heck, Baltimore, Md.

123,790.—TOOTH-PICK MACHINE.—Silas Noble and James P. Cooley, Granville, Mass. Ante-dated Feb. 1, 1872.

123,791.—LEVELING JACK FOR BILLIARD-TABLES.—Charles Paxton, Loveland, Ohio, and William H. Hull, Coffeyville, Kan.

123,792.—DREDGE-BOX.—William S. Putwin, assignor to Frank Sturges & Co., Chicago, Ill.

123,793.—SECTIONAL STEAM-BOILER.—David Renshaw, Syracuse, N. Y.

123,794.—CLOTHES-WRINGER.—Edwin P. Russell, Manlius, N. Y.

123,795.—STEAM-BOILER LOW-WATER ALARM AND FIRE-EXTINGUISHER.—Benjamin R. Singleton, assignor of one-half his right to Henry S. Hopkins, St. Louis, Mo.

123,796.—SCHOOL-DESK.—William A. Slaymaker, Atlanta, Ga.

123,797.—SCHOOL-DESK.—William A. Slaymaker, Atlanta, Ga.

123,798.—WATCH-CASE SPRING.—Charles Tribby, assignor to himself and Jacob Hoover, Washington, D. C.

123,799.—APPARATUS FOR THE MANUFACTURE OF BISULPHITES.—Walter James Turner, Bradford, England.

123,800—CUTTER HEAD.—Alexander Van Vleck, Jordan, N. Y.

123,801.—COMPOSITION FOR PRESERVING WOOD, COATING SHIPS' BOTTOMS, ETC.—Guillaume A. Vivien and Paul C. Vivien, Honfleur, France.

123,802.—ROLLING-SHUTTER.—Herman Von Langden and Adam Robb, Chicago, Ill.

123,803.—CANDLE LAMP OR HOLDER.—Martin Weis, assignor to Thomas Scott Williams and Phillip S. Page, Boston, Mass.

123,804.—LIFTING APPARATUS.—George B. Windship, Boston, Mass.

123,805.—APPARATUS FOR FORMING PLOWSHARES.—Ephraim Ball, Jun., assignor to himself and John Ball & Co., Canton, Ohio.

123,806.—FOLDING-TABLE.—Alfred C. Ballard, Winooski, Vt.

123,807.—GOPHER-TRAP.—John Bowman, Santa Cruz, Cal.

123,808.—ELECTRO-MAGNETIC ANNUNCIATOR.—Charles E. Chinnock, New York, assignor to Edwin Holmes, Brooklyn, N. Y.

123,809.—CARRIAGE.—Lawrence W. Coe, Auburn, N. Y.

123,810.—MATERIAL FOR FILLING MATTRESSES, MAKING PAPER, ETC.—Francis C. Cone, San Francisco, Cal.

123,811.—PAPER BAG.—Luther C. Crowell, Boston, assignor of one-fourth his right to Luther Crane, Cambridge, and one-fourth his right to Galen Coffin, Boston, Mass.

123,812.—PAPER-BAG MACHINE.—Luther C. Crowell, Boston, assignor of one-fourth his right to Luther Crane, Cambridge, and one-fourth his right to Galen Coffin, Boston, Mass.

123,813.—MILK-COOLER.—Charles A. Douglas, Franklin, N. Y.

123,814.—FANNING-MILL.—John Drummond, Trenton, Mo.

123,815.—BRUSH FOR APPLYING BLACKING TO BOOTS AND SHOES.—Nathan Eisenman, New York City

123,816.—DOOR OR SHUTTER FASTENER.—William Fields, Wilmington, Del.

123,817.—LATCH.—J. Hyde Fisher, Chicago, Ill.

123,818.—DROP-LEAF ATTACHMENT FOR SEWING-MACHINE TABLES.—Evelyn F. French, New York City.

123,819.—IRONING MACHINE.—Anson G. Gardner, Troy, N. Y.

123,820.—CULINARY BOILER.—Joseph Gibbs, Opelousas, La.

123,821.—OTTOMAN AND HASSOCK.—George B. Green, Staffordshire, England. Ante-dated Feb. 5, 1872.

123,822.—MACHINE FOR FORGING THE HEADS OF BOLTS.—Jeremiah Greenwood, Fitchburg, Mass.

123,823.—MANUFACTURE OF SCREW-THREADED NUTS.—Chauncey Holmes Guard, Toronto, Canada.

123,824.—BALING SHORT-CUT HAY AND STRAW.—William Hadwin, Rochester, N. Y.

123,825.—STEAMBOAT-CHIMNEY.—William J. Hamilton, Cairo, Ill.

123,826.—STOP-MOTION FOR DRAWING-FRAMES.—Daniel W. Hayden, Wauregan, Conn.

123,827.—RULING-PEN.—Elliot Ingram, Springfield, Mass.

123,828.—PROJECTILE FOR FIRE-ARMS.—Samuel E. Jones, Santa Fé, Territory of New Mexico.

123,829.—COMBINED TABLE, SOFA, AND BED.—David Katzenstein, New York City.

123,830.—TRAVELING-BAG.—Jacob Lagowitz, Newark, N. J.

123,831.—DEVICE FOR LOCKING NUTS.—Samuel B. Lowe, Chattanooga, Tenn.

123,832.—FOLDING-CHAIR.—Charles Marcher, New York City.

123,833.—CAR-WINDOW.—William McCaull, Philadelphia (Frankford P. O.), Pa.

123,834.—EXTENSION-LADDER.—Louis N. Millener, Adams' Basin, N. Y.

123,835.—LAST.—William J. B. Mills, Philadelphia, Pa., assignor to De Witt C. Taylor, trustee, New York City. Ante-dated Feb. 5, 1872.

123,836.—CARRIAGE-WHEEL.—Alexander M. Ocobock, Toledo, Ohio.

123,837.—COLLAR FOR SHEET-METAL VESSELS.—Jacob M. Patterson, Woodbury, N. J.

123,838.—PLOW-COLTER.—Joseph Pinkham, New Market, N. H.

123,839.—MOUSTACHE-GUARD.—Eli J. F. Randolph, New York.

123,840.—CAR-BRAKE.—George H. Reynolds, Parsons, Kan.

123,841.—AWL FOR PEGGING-MACHINES.—Everett P. Richardson, Lawrence, Mass.

123,842.—COOKING-STOVE.—George Ryder, Chicago, Ill.

123,843.—SPRING FOR DOORS AND GATES.—Cyrus W. Saladee, St. Catharine's, Canada, assignor to himself and L. Dobbins, Erie, Pa.

123,844.—TROLLING-HOOK.—George Sinclair, assignor to himself and Charles E Sinclair, Chicago, Ill.

123,845.—STEAM-BOILER.—Michael Smart, New York City.

123,846.—POTATO-DIGGER.—William W. Speer, Pittsburg, Pa.

123,847.—WELL-AUGER.—Francis Spees, Tabor, Iowa.

123,848.—GLOBE-VALVE.—Eli Thayer, Worcester, Mass.

123,849.—MACHINE FOR CUTTING FILES.—Alfred Weed, Boston, Mass.

123,850.—MACHINE FOR DRYING PAPER, WADDING, ETC.—Elihu C. Wilson, assignor to himself and Edward Eaton, Medway, Mass.

123,851.—PRESERVE-JAR.—A. Quarles Withers, Holly Springs, Miss.

123,852.—SEWING-MACHINE.—Quinten M Youngs, Utica, N. Y.

123,853.—COTTON-BALE TIE.—Gayetano W. Adams, assignor to George P. Crane, New Orleans, La.

123,854.—FENCE.—Alfred M. Aplin, assignor to himself and James W. Minnich, Chetopah, Kan.

123,855.—REGISTERING STEAM-GAUGE.—Edward H. Ashcroft, Boston, Mass.

123,856.—UTERINE SUPPORTER.—Leland A. Babcock, Freeport, Ill.

123,857.—COMPOUND RECIPROCATING ENGINE.—Henry Bertieaux, Antwerp, Belgium.

123,858.—PLOW.—Cealy Billups, Norfolk, Va.

123,859.—APPARATUS FOR FILLING AND EMPTYING OIL-TANKS.—David Birdsall, assignor to Thomes Joyce, Brooklyn, N. Y., and John D. Averill, New York City.

123,860.—MACHINERY FOR PUDDLING IRON, ETC.—Vincent S. Bloomhall, assignor to himself and Alan Wood, Jun., Conshohocken, Pa.

123,861.—CURTAIN-FIXTURE.—Edward T. Briggs, Boston, Mass.

123,862.—WASHING MACHINE.—Porter B. Bristol, Auburn, N. Y.

123,863.—SELF-CENTERING CHUCK FOR LATHES.—George O. Buckley, New Bedford, Mass.

123,864.—MOWING MACHINE.—John J. Bulfinch, Freeport, and Frank Bulfinch, Waldoborough, Maine.

123,865.—CAR-AXLE LUBRICATOR.—Walter P. Burrow, Norfolk, Va.

123,866.—BRIDLE-BUCKLE.—David S. Butler, Brownsville, Mo.

123,867.—SPINDLE AND WHORL FOR SPINNING MACHINES.—William T. Carroll, assignor to Simeon S. Cook, Woonsocket, R. I.

123,868.—COTTON-GIN.—John G. Case, New London, Conn., assignor to himself and Charles W. Matthews, Philadelphia, Pa.

123,869.—GANG PLOW.—Frank G. Charles, Galesburg, Ill.

123,870.—APPARATUS FOR SUSPENDING GLASS BOWLS UNDER GAS-BURNERS.—Jesse C. Conner, New York City, assignor of one-half his right to Hubbard H. Duncklee, Brooklyn, N. Y.

123,871.—SIGN.—John H. Crane and Charles W. Crane, Boston, Mass.

123,872.—VISE.—Edwin Crawley and Thomas L. Baylies, Richmond, Ind. Ante-dated Feb. 16, 1872.

123,873.—ICE PLOW.—James H Cutter, Cambridge, Mass.

123,874.—FIRE-EXTINGUISHER FOR STEAM-BOILERS.—Albert G. Davids, assignor of one-half his right to Henry M. Warfield, Baltimore, Md.

123,875.—MANUFACTURE OF SULPHATES OF POTASH, SODA, ETC.—Henry Deacon, Appleton House, near Warrington, Eng.

123,876.—CULINARY BOILER.—John Dykes Durham, Dalston, assignor to Ernest Brammer, London, England.

123,877.—LEADER-BRACKET.—Stephen J. Dwyer, Albany, N. Y.

123,878.—TELEGRAPH-INSULATOR.—David R. P. Emminger, Harrisburg, Pa.

123,879.—VAPOR-BURNER.—Henry Fayette, Brooklyn, N. Y.

123,880.—COMBINED LETTER-BOX, ALARM, AND DOOR-PLATE.—Zebina E. Fobes, Troy, N. Y., assignor of one-half his right to Henry Patchin, Bennington, Vt.

123,881.—THILL-COUPLING.—William G. Foster, Dansville, N. Y.

123,882.—STEAM-BOILER FURNACE.—Charles H. Fox, New Orleans, La.

123,883.—CARTRIDGE-BOX.—Joseph W. Frazier, Newark, N. J.

123,884.—CARTRIDGE-BOX.—Joseph W. Frazier, Newark, N. J.

123,885.—KNAPSACK.—Joseph W. Frazier, Newark, N. J.

123,886.—DRILLING MACHINE.—William Gardam and Joseph Gardam, Williamsburg, N. Y.

123,887.—APPARATUS FOR TREATING DISEASES IN VACUO.—Rodman Stoddard Gee, Delavan, Wis.

123,888.—SAND-PAPER HOLDER.—John D. Gernez, New York City.

123,889.—FLOOD-FENCE.—Robert S. Gilcrest, De Graff, Ohio.

123,890.—MACHINE FOR GRINDING CUTTER-BARS FOR HARVESTERS.—John H. Griffin and James S. Griffin, Harvard, Ill.

123,891.—PISTON PACKING.—George Gwynn, New York City.

123,892.—SEWING-MACHINE.—Thomas Hall, Florence, Mass. Ante-dated Feb. 9, 1872.

123,893.—WASHING MACHINE.—John C. Hallenbeck, Chatham Village, N. Y.

123,894.—FURNACE FOR SMELTING IRON AND OTHER ORES.—Samuel W. Harris, Hudson, N. Y.

123,895.—MACHINE FOR DRYING YARN.—Richard Hartmann, Chemnitz, Saxony.

123,896.—DEVICE FOR LOWERING AND RAISING STEAMBOAT CHIMNEYS.—Charles Hawthorn and Robert Hawthorn, Allegheny, Pa.

123,897.—FLY-TRAP.—David Henderson, North Bridgewater, Mass.

123,898.—BOTTLE-STOPPER.—Peter R. Higley, Oshawa, Canada, assignor of one-half his right to C. E. Higley, Rochester, N. Y.

123,899.—MEAT-MINCER.—Louis Holzwarth, Henry Froelsch, and Theodore Gerhards, Philadelphia, Pa.

123,900.—STOVE-PLATFORM.—Julius Hopke, Hoboken, N. J.

123,901.—PAPER-CUTTING MACHINE.—Patrick H. Hopkins, Brooklyn, N. Y.

123,902.—GATE.—James J. Hoss and John T. Hoss, Tipton County, Ind.

123,903.—FORMATION OF DRIVE-WELLS.—Elias S. Hovey, Independence, Iowa.

123,904.—CHILDREN'S NURSERY-GATE.—Eugene Howard, Milford, Mass.

123,905.—SAFETY-MATCH.—Henry Howse, London, Great Britain.

123,906.—LABEL-GUMMING APPARATUS.—John Henry Hudson, assignor to Jean O. Harra, and Louis Ay, Winona, Mich.

123,907.—DISTILLING COAL-OILS.—Samuel Hudson, Plainfield, N. J.

123,908.—LIFE-BOAT.—Oliver R. Ingersoll, Brooklyn, N. Y., assignor to John Johnston, New York City.

123,909.—THILL-COUPLING.—Daniel A. Johnson, Boston, Mass.

123,910.—RUFFLING-ATTACHMENT FOR SEWING-MACHINES.—Allen Johnston, Ottumwa, Iowa.

123,911.—AUTOMATIC GOVERNOR.—Charles H. Jones and Henry D. Hall, North Bennington, Vt.

123,912.—DEVICE FOR OPENING OR CLOSING UMBRELLAS.—Edward P. Jones, Shell Mound, Miss. Ante-dated Feb. 5, 1872.

123,913.—ADJUSTING CAR-WHEELS UPON AXLES.—John Kaiser, assignor to Lobdell Car-wheel Company, Wilmington, Del.

123,914.—HOSE-COUPLING.—William A. Kenyon, Jun., and Frank S. Wagenhals, Lancaster, Ohio.

123,915.—SHAFT-SOCKET.—Frederick Kern, St. Louis, Mo.

123,916.—STONE-LIFTER AND STUMP-EXTRACTOR.—Josiah Knoop, Casstown, Ohio.

123,917.—LAMP-WICK.—Calvin P. Ladd, Bloomfield, N. J.

123,918.—AMALGAMATOR.—George C. Langtry and George Emmett, Gold Hill, Nev.

123,919.—ADJUSTABLE CAR-WHEEL.—George G. Lobdell, Wilmington, Del.

123,920.—BOTTLE-STOPPER.—Peter Malmström and Paul E. Dummer, New York City.

123,921.—MACHINERY FOR PRINTING YARN.—William McAllister, Lawrence, Mass.

123,922.—PUMP-VALVE.—David Metz, Pottsville, Pa.

123,923.—ELECTRIC LIGHT.—Auguste Annet Meynial, New York City.

123,924.—BEE-HIVE.—John E. Moore, Bridgewater, Pa.

123,925.—PRESS FOR STAMPING LEAD-PENCILS.—Teile H. Müller, Yonkers, N. Y., assignor to Joseph Reckendorfer, New York City.

123,926.—SIPHON-CAN FOR CARBURETER.—Robert Seely Osborn, Belleville, N. J., assignor to Thomas Joyce, Brooklyn, N. Y., and John D. Averell, New York City.

123,927.—DIE FOR MANUFACTURING OX-SHOES.—Bowdoin S. Parker, Greenfield, Mass.

123,928.—JOINT FOR SEATS AND DESKS.—John Peard, New York City.

123,929.—CARBURETING-LAMP.—Alonzo W. Porter and James S. Gray, New York City.

123,930.—Link-guide for coupling Cars.—Nathan L. Post, East Cleveland, Ohio.

123,931.—Lumber Measure.—Wesley S. Poulson, Cadiz, Ohio.

123,932.—Voltaic Amalgamator for Gold and Silver.—Julio H. Rae, Syracuse, N. Y.

123,933.—Plate-printing Machinery.—Judah Touro Robertson, New York City.

123,934.—Medical Compound for Cure of Piles.—Phillip Roskopf, Brooklyn (E. D.), N. Y.

123,935.—Toilet-rack.—David A. Russell, Walpole, N. H.

123,936.—Top-joint and its Connections.—Cyrus W. Saladee, St. Catharine's, Canada.

123,937.—Carriage-spring and Mode of Attachment.—Cyrus W. Saladee, St. Catharine's, Canada.

123,938.—Corset-spring.—George Otto Schneller, Ansonia, Conn.

123,939.—Governor for Steam-engines.—Isaac S. Schuyler, Brooklyn (E. D.), N. Y.

123,940.—Lamp.—Ira W. Shaler, Brooklyn, N. Y.

123,941.—Fruit-box.—James Shepard, Bristol, Conn.

123,942.—Slat-iron for Carriage-tops.—Joseph W. Sheppard, Plantsville, Conn.

123,943.—Die for making Perch-irons.—Joseph W. Sheppard, Plantsville, Conn.

123,944.—Weeding Machine.—Arthur H. Sherwood, assignor to himself, John S. Fray, and Horace Pigg, Southport, Conn.

123,945.—Saw-grinding Machine.—Charles T. Shoemaker, assignor to Henry Disston & Sons, Philadelphia, Pa.

123,946.—Water-meter.—Gerard Sickels, Boston, Mass.

123,947.—Book-binding.—George Smith, Bridgeport, Conn.

123,948.—Horse-collar.—Andrew Snively, Terre Haute, Ind.

123,949.—Axle-lubricator.—Moritz Soellinger and Henry Noetzli, assignors of one-third their right to Felix Gremminger, Keokuk, Iowa.

123,950.—Manufacture of Illuminating Gas from Petroleum.—William H. Spencer, Brooklyn, N. Y.

123,951.—Screw-cutting Machine.—Levi W. Stockwell, Ravenna, Ohio.

123,952.—Loom-picking Mechanism.—Enoch P. Terrel, assignor to himself, David B. Allen, J. William Brown, and Lucian A. Williams, West Liberty, Ohio.

123,953.—Chill for casting Chilled Rolls.—Robert Tolmie, assignor to George G. Lobdell, and William Stuart, Wilmington, Del.

123,954.—Pipe-joint.—Samuel Trumbore, Easton, assignor to himself and B. E. Lehman, Bethlehem, Pa.

123,955.—Folding Wash-bench.—John Napoleon Valley, North East, Pa.

123,956.—Gas-cock for Soldering.—William L. Walker and Idwal M. Jones, assignor to Charles W. Fields, Providence, R. I.

123,957.—Plow.—James Wallace, Sheridan, Pa.

123,958.—Lightning-rod.—Dwight F. Welsh, Nevada, Ohio.

123,959.—Combined Cultivator, Seeder, and Stalk-cutter.—James Whalt and William Whalt, Independence, Iowa.

123,960.—Handle for Children's Carriages.—James H. White, Newark, N. J.

123,961.—Pickle-caster.—Horace C. Wilcox, assignor to the Meriden Britannia Company, West Meriden, Conn.

123,962.—Artificial Fuel.—Charles D. Williams, St. Paul, Minn.

123,963.—Dinner-pail.—Levi K. Williams, Hudson, Mich.

123,964.—Manufacture of Scythe-blades.—Nathaniel P. H. Willis, Chelsea, Mass.

123,965.—Fender for Furniture.—George R. Wilmot, Meriden, Conn.

123,966.—Potato-digger.—Daniel S. Wing and Henry Green, Rome, N. Y.

123,967.—Grain-binder.—Charles B. Withington, Janesville, Wis.

123,968.—Roll for Carding Machines.—Edward J. Worcester, Worcester, Mass.

123,969.—Musical Instrument.—Augustus Young, Norfolk, Va.

123,970.—Automatic Signal-box for Fire-alarm Telegraphs.—George Wright, Minard Y. Holley, and Henry R Miles, Washington, D. C.

RE-ISSUES.

4,762.—Valve-cock.—Seth Adams, Boston, Mass, assignor of part interest to Joseph H. Davis, Pittsburg, Pa. Patent No. 20,314, dated May 25, 1858.

4,763.—Circular-saw Mill.—Jonathan P. Grosvenor, Lowell, Mass. Patent No. 96,224, dated October 26, 1869.

4,764.—Head-block for Saw-mills.—Dennis Lane, Montpelier, Vt. Patent No. 79,484, dated June 30, 1868.

4,765.—Machine for stamping Sheet-metal Ware.—William D. Grimshaw, Ansonia, Conn., assignor of two-thirds interest to F. Parker Erskine, Chicago, Ill., and John B. Peabody, New York City. Patent No. 84,625, dated Dec. 1, 1868.

4,766.—Water-wheel.—Jose Tort, Mexico, Republic of Mexico. Patent No. 95,954, dated October 19, 1869.

DESIGNS.

5,543.—Bolster for Table Cutlery.—Matthew Chapman, Greenfield, Mass.

5,544.—Chain-link.—Virgil Draper, assignor to Oscar M. Draper, North Attleborough, Mass.

5,545.—Cross-bar of a Chain.—Virgil Draper, assignor to Oscar M. Draper, North Attleborough, Mass.

5,546.—Oil-cloth Pattern.—James Hutchison, assignor to Thomas Potter, Son & Co., Newark, N. J.

5,547.—Parlor-stove.—John Martino and John Currie, Philadelphia, Pa.

5,548.—Border for Vases, etc.—Jonathan Moore, assignor to himself and Abram Horton, Brooklyn, N. Y.

5,549 to 5,552.—Carpet-pattern.—William McCallum, Yonkers, N. Y., assignor to Joseph Wild & Co., New York City.

5,553.—Soda-fountain.—George F. Meacham, Newton, assignor to James W. Tufts, Medford, Mass.

5,554 and 5,555.—Carpet-pattern.—David Paton, assignor to Joseph Wild & Co., New York City.

5,556.—Croquet Implement.—Job W. Pettengill, Rockford Ill.

TRADE-MARKS.

658.—Gin.—Adams & Taylor, Boston, Mass.

659.—Whisky.—Adams & Taylor, Boston, Mass.

660 and 661.—Knitting-cotton.—James Atwell, Jun., New York City.

662.—Welting-cord.—James Atwell, Jun., New York City.

663.—Calico Prints.—Coffin & Altemus, Philadelphia, Pa.

664.—Refrigerators and Water-coolers.—Alexander M. Lesley, New York City.

665.—Concentrated Ammoniate.—Navassa Phosphate Company, New York City.

666.—Cutlery.—George Wostenholm & Son, Sheffield, Eng.

EXTENSIONS.

19,384.—Bank-check Canceler.—William M. Simpson. Feb. 16, 1858.

19,377.—Harvester.—Frederick Nishwitz. Feb. 16, 1858; re-issued March 5, 1861; again re-issued April 13, 1869, No. 3,371.

19,377.—Harvester.—Frederick Nishwitz. Feb. 16, 1858; re-issued March 5, 1861; again re-issued April 13, 1869, No. 3,372.

19,483.—Harvester.—Jesse S. Butterfield. March 2, 1858; re-issued to Andrew J. Holman, assignee, Jan. 15, 1867, No. 2,453.

19,347.—India-rubber Door-mat.—Edwin F. Chaffee. Feb. 16, 1858.

19,316.—Propelling Canal-boats.—Herman Camp. Feb. 16, 1858.

19,393.—Hydraulic Valve.—Calvin Woodward and George M. Woodward. Feb. 16, 1858.

19,370.—Knitting Machine.—Joseph K. Kilbourn and Edward E. Kilbourn. Feb. 16, 1858.

19,349.—Shingle Machine.—George Craine. Feb. 16, 1858.

APPLICATIONS FOR EXTENSIONS.

Opponents of extensions must file *written* objections in the Patent Office at least 20 days before the day-of-hearing; and on the Patent Office, and state the reasons of their opposition. All testimony—*pro* or *con*—must be taken and transmitted in accordance with the official rules, which will be furnished on application. The under-named patentees have recently petitioned for extensions (for seven years) of patents granted to them in the year 1858:—

J. B. Creighton, Akron, Ohio.—*Railroad Car for Day and Night Service*—Patented May 18, 1858; re-issued Sept. 21, 1858; testimony will close on April 16, next; last day for filing arguments and examiner's report, April 26; day-of-hearing, May 1.

Joseph Jordan, Jun., Manayunk, Pa., and Thomas Eustice, Hartford, Conn.—*Machine for grinding and sizing Paper-pulp*—Patented May 18, 1858; re-issued Dec. 4, 1860; testimony will close on April 16, next; last day for filing arguments and examiner's report, April 26; day-of-hearing, May 1.

Horace Woodman, Saco, Maine.—*Power and Hand Drill.*—Patented May 25, 1858; testimony will close on April 23, next; last day for filing arguments and examiner's report, May 3; day-of-hearing, May 8.

Dexter Pierce, Pawlet, Vt.—*Clothes-pin.*—Patented May 25, 1858; testimony will close on April 23, next; last day for filing arguments and examiner's report, May 3; day-of-hearing, May 8.

George K. Snow, Watertown, Mass.—*Machine for affixing Post-office Stamps to Letters.*—Patented May 18, 1858; re-issued Aug. 20, 1867; testimony will close on April 16, next; last day for filing arguments and examiner's report, April 26; day-of-hearing, May 1.

John C. Birdsell, South Bend, Ind.—*Machinery for hulling and thrashing Clover.*—Patented May 18, 1858; re-issued April 8, 1862; testimony will close on April 16, next; last day for filing arguments and examiner's report, April 26; day-of-hearing, May 1.

J. S. Troxel, Greensburg, Pa.—*Harvester.*—Patented May 11, 1858; and re-issued on June 11, 1867, and Aug. 20, 1867; testimony will close on April 9, next; last day for filing arguments and examiner's report, April 19; day-of-hearing, April 24.

Solomon P. Smith, Waterford, N. Y.—*Car-wheel*—Patented May 29, 1860; and re-issued Feb. 13, 1872; the same having been patented in England May 14, 1858; testimony will close on April 16, next; last day for filing arguments and examiner's report, April 26; day-of-hearing, May 1.

ENGLISH PATENT JOURNAL.

LIST OF APPLICATIONS FOR PATENTS

ON WHICH

Provisional Protections

HAVE BEEN OBTAINED IN ENGLAND BY OR FOR AMERICAN INVENTORS.

[*This list is condensed weekly from the "Journal of the British Commissioners of Patents," expressly for the "*American Artisan.*"*]

162.—Process of waterproofing Leather, etc.—Wm. Morris, Philadelphia, Pa.—Jan. 18, 1872.

163.—Improvement in relief valves, etc.—A. F. Allen, Providence, R. I.—Jan. 18, 1872.

169.—Printing-press.—A. Campbell, Brooklyn, N. Y.—Jan. 18, 1872.

179.—Mechanical clutch for friction brakes.—F. G. Bates, Springfield, Mass., R. Baker, Middletown, Conn., and P. Ferguson, New Haven, Conn.—Jan. 19, 1872.

180.—Lock for firearms.—W. F. Parker, Meriden, Conn.—Jan. 19, 1872.

218.—Hoist or elevator.—Thomas Silver, New York City.—Jan. 23, 1872.

219.—Mechanism for changing shuttle-boxes in looms.—James Brierly, Worcester, and James Brierly, Milbery, Mass.—Jan. 23, 1872.

220.—Railway carriage axles and wheels.—E. Doty and G. W. Miltimore, Janesville, Wis., R. Mickel, Chicago, Ill., and J. Mickel, New Lisbon, N. Y.—Jan. 23, 1872.

Letter Box

G. L., of N. Y.—The method of galvanizing iron with a crystalline surface is as follows:—Clean the plates with dilute muriatic acid, and scouring with sand or emery. Lay the plates alternately with their layers of granulated zinc in a bath of two quarts of muriate of tin in three hundred gallons of water. In about two hours a thin film of tin will be deposited by galvanic action on the plates. The tinned plates are then lifted and drawn through a bath of molten zinc, covered with sal-ammoniac to prevent the oxydation of the zinc during the process.

E. N., of Ind.—Some years ago, in the composing-room of the New York *Tribune*, type-cases with movable bottoms were introduced, and, we believe, gave good satisfaction. The bottoms could always be kept conveniently full in composition, and in distribution could be lowered to receive any quantity of type.

O. P., of Ill.—So far as we know, your combination of a drying device with a header and thrasher is novel and patentable. But it is doubtful if you would find the manufacture of the machines a paying process. To cut the heads from the standing grain, pass them to an oven to make them dry enough to thrash, and then to thrash, winnow, and sack, is rather too complicated and expensive an operation, we should say. Your mode of conveying the heads to the thrasher is, however, by itself apparently both new and useful, and in California and Australia, where the grain ripens dry enough for thrashing direct from the harvester-cutters, it might, perhaps, be advantageously used.

A. N., of Vt.—Your machine for drying wool in all but the merest details is identical with that of Hiram Smith, patented in 1863. He claimed "an elongated fan extending through the whole length of the air-chamber," and operating in a certain specified manner. You are correct in thinking that the utilization of the *suint* of wool offers an opportunity for profitable invention, and your ideas on this subject seem to us to be of value.

E. L. O., of N. J.—To make a good washing-fluid, powder half a pound of borax, and dissolve it in twenty gallons of water.

B. R., of Pa.—If, from the construction of your apparatus, you cannot introduce iron bands or screws to join the splints, try raw-hide, applied wet. In drying, it will shrink and hold firmly as long as protected from moisture. To avoid absorption of moisture from the air, coat with an ordinary waterproof varnish.

T. J., of N. Y.—Experiments were made years ago to produce illuminating gas from coal-tar by the action of superheated steam, and proved miserable failures.

L. M. S., of Conn.—We know of no machine for crushing boiled roots, etc., and mixing them with meal for cattle-feed. This is ordinarily very imperfectly done by manipulating the materials with a scoop-shovel.

K. S., of Ohio.—You will be unable to fuse platinum in graphite crucibles, as the carbon will unite with the metal to make it brittle. There have been instances where platinum has been fused with coke in clay crucibles, but the plan is probably of no practical value.

U. F., of N. H.—You can make a cheap ink by dissolving three ounces of the solid extract of logwood in four gallons of water, and adding half an ounce of bichromate of potash dissolved in a pint of water. It will not corrode steel-pens, and is said to be quite permanent.

L. C. N., of Mass.—You can easily estimate the quantity of asphalt required for your cellar. Eight pounds will cover one cubic foot to the depth of about three-fourths of an inch.

E. R., of Miss.—One cubic foot of earth rammed or compacted will weigh one hundred pounds. A cubic foot of marble weighs one hundred and sixty-eight pounds.

W. S., of Mo.—Hot-blast has been used at a temperature of seven hundred degrees with advantage. It has been found in some Scottish iron-works that a saving of five cwt. of coke per tun of iron was effected by using a blast of six hundred and fifty, instead of one at four hundred degrees, as had previously been used.

T. W., of Ky.—Your plan of making a metal railway-car of steel wire woven stiffly to form sides and roof, would seem more feasible if you had described any adequate means of performing the operation.

THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY.

WE herewith present an engraving of the Massachusetts Institute of Technology, a Boston institution holding high rank for the practical character of the instruction given and the comprehensive range of studies taught in its classes. These include in a four years' course pure and applied mathematics, the physical and natural sciences and their applications, drawing, mental and political science, and, of the languages, English, French, and German. These studies are arranged to qualify the students for the practical pursuit of any of the industrial arts. All the studies of the first and second years are pursued by the whole school; but at the commencement of the third year each student elects to follow one or another of the following special courses:—

I. A Course in Mechanical Engineering.
II. A Course in Civil and Topographical Engineering.
III. A Course in Geology and Mining Engineering.
IV. A Course in Building and Architecture.
V. A Course in Chemistry.
VI. A Course in Science and Literature.
VII. A Course in Natural History.

"During the first two years, the whole subject of physics is discussed in a series of lectures, which are attended by all the regular students. The various branches are treated both mathematically and experimentally, and especial attention is given to the explanation of the methods which have been used in the most extended investigations of general physical laws. In all cases, the theoretical discussion of the question is followed by a full account of its practical applications. The Institute possesses an extensive collection of physical apparatus. The lectures are also illustrated by a very large number of photographs on glass, which are projected upon a screen by means of the calcium light.

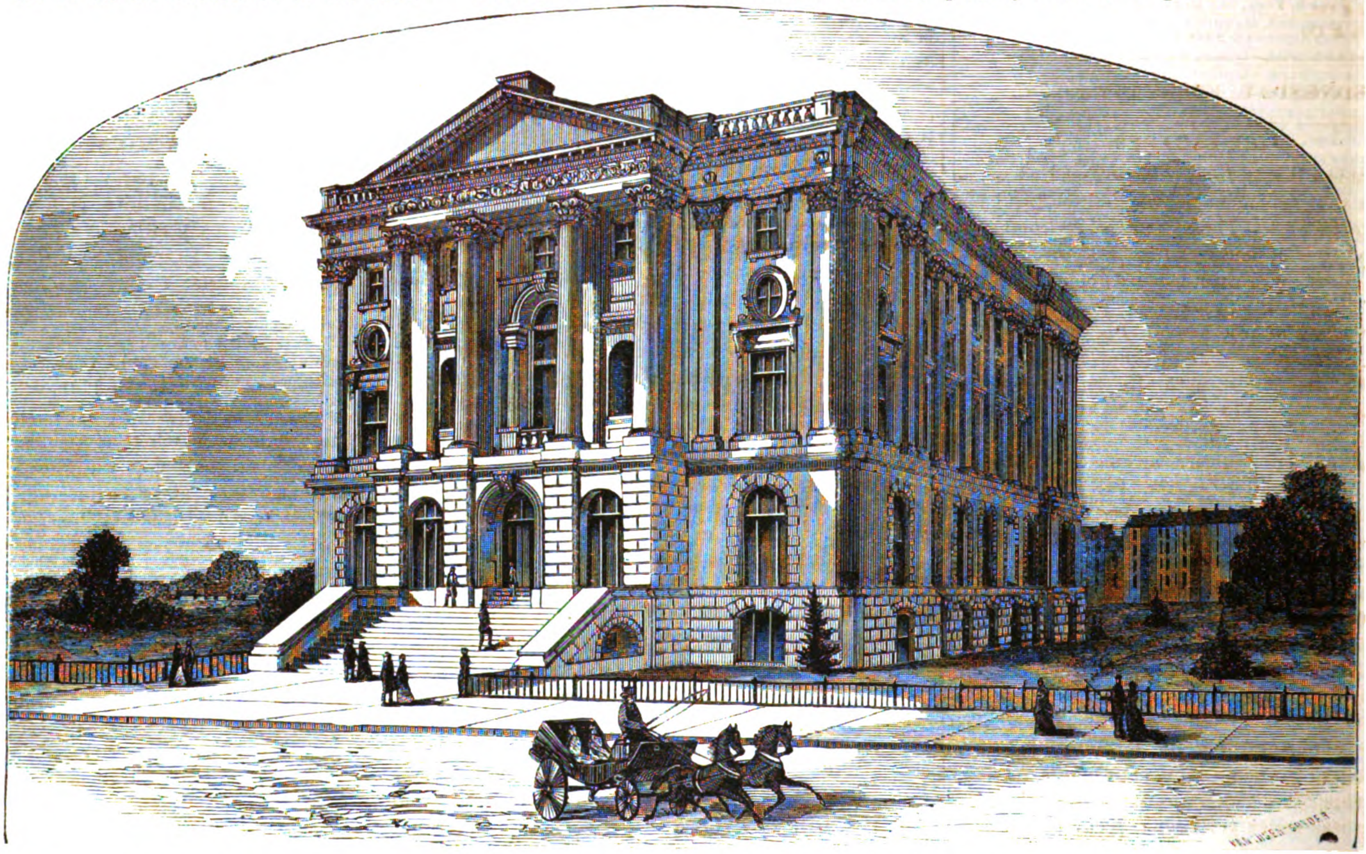
"In the third year the students enter the physical laboratory, and learn to use the different instruments and to perform a variety of experiments. Special attention is paid to the testing of physical laws, by comparing the observed and computed results. In the fourth year they carry on systematic investigations of particular subjects, or pursue such portions of certain specified courses as have a direct bearing on their professional studies."

We have not space for a detailed sketch of the method of instruction pursued in each department, but append in full that given of the course in mechanical engineering, not only as an example of the system now most approved in the schools, but as affording hints of mental drill to some who may be striving to educate themselves without the very great advantage of skillful and energetic teachers.

"Besides the ordinary lectures and recitations, there are in the department of mechanical engineering two distinct kinds of instruction; the first is that given in the drawing rooms in making sketches and finished drawings of machinery from models; the second is the practical instruction by projects. These projects, given in connection with the lectures and complementary to them, are of three kinds. The projects of the first kind comprise those in applied cinematics, having for their object to determine, from the graphical representation of the motion, the form adapted to each piece of mechanism. They include the construction of cams, eccentrics, link-work, and all kinds of gearing. Projects of the second kind are exercises in the construction of parts of machines, such as axles, cranks, valves, pistons, and finally of complete machines, from numerical data. Projects of the third kind are not given until the students have been made acquainted with the doctrine of the strength of materials, so as to be able to find the dimensions of pieces to resist flexure, shearing, torsion, etc. They consist of original designs for machines, involving the determination of the strength, dimensions, and proper proportions of the several parts by calculation."

Instruction in civil engineering is given by lectures and recitations, and by practice in the field and upon the drawing-board. In mining engineering, the chemical processes, etc., are made identical, as nearly as possible, with those actually required in practice. A mining and metallurgical laboratory is maintained, and is provided with the most approved dressing and mill machinery for gold and silver ores now in use in California and Nevada, "consisting of an ore-crusher, a five-stamp battery, an amalgamating pan, a separator, and a concentrator; and the equipment will be completed by the addition of roasting and smelting furnaces, and all the machinery necessary for treating all kinds of ores."

"The experimental work of the laboratory is carried on by the students under the immediate supervision of an instructor. A sufficiently large quantity of ore is assigned to each student, who first samples it, and determines its character and value by analysis and assays, and makes such other preliminary examinations as serve to indicate the proper method of treatment. He then treats the given quantity, makes a careful examination of the products at each step of the process, ascertains the amount of power, water, chemicals, fuel, and labor expended, and thus learns approximately the effectiveness and economy of the method adopted. The Institute has now on hand about eleven tuns of gold and silver ores, representing over seventy different mines in Colorado and Utah, which were collected by the Institute party of professors and students during their recent trip to these Territories." In connection with this department, moreover, there is a "typical set of models of mining machinery, chiefly from Freiberg, Saxony, used in the course of instruction. They are designed mainly to illustrate the principles of the various processes of mining and ore dressing, but combine also the latest improvements in machines. They show, in detail, the methods of working underground by underhand and overhand stoping, the timbering and walling of shafts and levels, the arrangements of pumps, man-engines, ladder-ways, hoisting-ways, the sinking of shafts, etc. The machines for ventilation, as well as those for ore-dressing, are working models, with all their parts made proportional. The latter illustrate all the stages of the concentration of ores. It is proposed, as opportunity offers, to add to this collection other similar models. The collection of ores and vein stones is constantly receiving additions from the various mining regions."



AMERICAN ARTISAN

BROWN, COOMBS & CO., Publishers.

ISSUED WEEKLY AT

No 189 Broadway, New York.

H. T. BROWN. J. W. COOMBS.

AGENTS.

AMERICAN NEWS COMPANY................New York City.
NEW YORK NEWS COMPANY.................do
NEW ENGLAND NEWS COMPANY.... ....Boston.
A. WINCH & Co................................Philadelphia.
H. TAYLOR & Co...............................Baltimore.

WEDNESDAY, FEBRUARY 28, 1872

FIRE-ESCAPES.

THERE is a law in force in New York City which requires that tenement-houses shall be furnished with fire-escapes. These apparatus commonly consist of an iron balcony in front of the windows of each story, with iron ladders extending to the ground. These are, perhaps, the most economical in construction of any that could be devised; they are not liable to get out of order, and, although some difficulty might naturally be expected in securing by their aid the escape of women and children frightened by flames raging in their dwelling, they are doubtless as efficient as any yet devised for operation without skilled assistance. Their unsightliness, however, is a drawback that seems to stand in the way of their adoption in cases where the appearance of the building is a matter of solicitude. This is illustrated by an example that came before the courts a few days since. The owner of a building occupied by several families claimed exemption from the provisions of the law on the ground that the structure was not a "tenement-house," but a "French flat." To this the Superintendent of Buildings excepted that changing the name did not change the fact, and that the superior social status of the occupants of a dwelling was never yet known to save them from the consequences of a conflagration around them. It may be some time before it is decided whether a French flat must have a fire-escape like a tenement, but it requires only a little common sense to see that it is quite right that in neither should any precautions against danger from fire be neglected.

In noting the history of fire-escapes—and the subject is periodically agitated every few years—it will be found that the matter has been almost wholly neglected by builders, and the invention of safety apparatus has been mainly directed to buildings not made with any direct reference to their use. This is to a certain extent necessary, for houses could scarcely be rebuilt to adapt them especially to the adoption of a fire-escape. But in the original construction of buildings the matter is different, and architects are to blame for not placing a fire-escape in the same important category with other "modern improvements." Had this been enjoined as a rule in New York City ten years ago, a very large proportion of its dwellings would to-day be exempt from all danger to the lives of their occupants because of fire, and the advantages afforded for the saving of property as well as life would, doubtless, have led to some little abatement from the now current rates of insurance.

FARM TRAMWAYS.

THE exigencies of agriculture in other countries frequently call for appliances that would hardly meet with favorable consideration here, as, for example, the wire-rope tramway used for transporting beet-roots from the fields to the factory on some of the sugar farms in France. The same remark will apply to another project, also lately introduced in France, by M. Henri Corbin, who, for agricultural transport, proposes to lay down wooden rails topped with iron, and serving as roadways for trains peculiar in construction and unique in operation. The function of the locomotive is to simply supply steam to engines on the cars, each car carrying its own motor appropriately connected with its wheels. In this way, the adhesion of all the wheels of the train upon the rails is to be secured instead of that only of the locomotive drivers. The idea has little novelty, and is notable rather for the boldness with which it is advocated for farm uses—purposes which, for more than ordinary transit or transportation, require cheapness and simplicity in all the means employed.

But the idea of portable railways—even though the cars, like the "trolleys" of coal-mines, had to be run by manual power—is a good one. Portable tracks have been adopted with very great saving in the cost of hauling dirt, stone, etc., by railway contractors and engineers, and there are many cases where the same can be advantageously done in agricultural operations. In these latter, as in railway practice, the use of horses would be practicable if carts specially adapted to them were provided, but it is doubtful whether any track could be made, except at a cost greater than its worth, that would retain upon it the wheels of an ordinary lumber wagon. To provide the requisite stability to such a track, no doubt, a judicious combination of iron sleepers and fish-joints will be required, should the use of portable railways ever become sufficiently extended to direct attention to this, as yet, comparatively undeveloped branch of construction.

OUR STREETS.

AMONG the strongest evidences of the misgovernment to which New York City has been for many years subjected, there are none more palpable than the condition of many of the streets. In the First Ward, there are, it is stated on good authority, but ten carts and as many men employed to remove the accumulated refuse of the winter. Of course, this is wholly inadequate, and, aside from the inherent offensiveness of such a state of affairs, there must spring from it the almost absolute certainty that the irruption of any epidemic with the advent of warm weather will be both invited and strengthened by the festering rubbish allowed to gather and remain in the streets. As ordinarily constructed, our street-surfaces, even when swept and garnished, are bad enough in their capacity for absorbing substances sure to be afterward exhaled in the form of deadly vapors; but, when covered with several inches of decaying material, the nuisance should no longer be endured. Prompt action in clearing the surface is required for the preservation of the public health, and, as soon as spring opens, the liberal use of disinfectants should be resorted to.

The condition to which we have here alluded, however, will hardly be more than temporarily rectified until the entire system of street construction and cleaning is reorganized on a much more scientific basis than at present seems likely. The advantages of a pavement laid upon an impervious bed, both to keep noxious liquids from being absorbed and to prevent noisome vapors from being exhaled, have long been acknowledged, but no care is had to provide a layer of concrete under the cobble-stones. Every few years the project is loudly advocated of washing the streets with water drawn from the rivers on either side the city, a project shown to be perfectly feasible by the success of the Holly system of town supply, but no action has ever been taken on the plan. It is manifest, furthermore, that a man at the end of a shovel, even though much more energetic in its use than city employees are apt to be, is quite inefficient for street-cleaning compared to the machinery that would be at once projected and produced were there any likelihood that a street-cleaning apparatus would be adopted by those who have the management of our thoroughfares under their control, but who so persistently neglect them.

WIND WAGONS.

RECENTLY a car on the Lafayette and Bloomington Railway was blown by a gale along the track for a distance of six miles, at a rate rivaling that from the power of steam. Accident thus gave a modern example of what was one of the first projects for propelling cars on railways, viz., driving them by the pressure of the wind. In 1830, a car with a sail was tried on the South Carolina Railroad, and with the wind abeam carried fifteen passengers at a speed of fifteen miles an hour. Thirteen persons, together with three tuns of freight, were transported at ten miles an hour. But what seems even more surprising, it was found that the car would "sail within four points of the wind." We believe that wind cars were also proposed, but probably never tried, on the elevated one-rail tramways that forty years ago or thereabouts were favored by a class of English projectors.

As a practical method of locomotion, wind wagons, which have been tried under conditions other than those afforded on railway tracks, will hardly compete with any of the means common in civilized countries. But John Chinaman, who does nothing as any one else does it, and whose arrangements for work are very much like those of an ingenious boy, has contrived to bring the wind into subjection for purposes of propulsion, and this, too, in connection with that useful but commonplace appliance, the wheelbarrow. According to a volume recently published by a traveler in that country:—"In the northern provinces [of China], they use a kind of one-wheeled cart or wheelbarrow to which they attach sails, and trimming them to the wind manage to make the air push the load along, while the Cooley walks behind and steers with the handles, just as he would without the sail. This kind of wheelbarrow is sometimes seen in the lower provinces, especially when a laborer has a heavy load to carry a long distance. An instance where an emigrant rigged up a wheelbarrow after the European pattern, and put it under sail, was related by some of the English residents of Swatow, and it was striking in its originality. This Cooley traveled four hundred and twenty miles with the wheelbarrow and sail, having on board over two hundred pounds of baggage. In wind vehicles of this sort, the sail being fastened only at the top and bottom, and even there to hoops that will turn upon the mast, it will always keep its broadside to the wind, no matter in what direction the vehicle is turned. The skill is displayed in keeping the barrow up-

right in the gusts, and so turning in the selection of the path as to keep the wind behind the sail."

Concerning Cast-steel.

THE invention of cast-steel is assigned to Benjamin Huntsman, who perfected it in 1740, after many experiments and repeated losses and discouragements. He carefully guarded his secret, and for a long time with success, till it was discovered, as it is said, by a rival manufacturer disguised as a beggar, after which the manufacture soon became general. The melting process is as follows: The steel is broken into small pieces, and put by means of a conical-shaped funnel into a melting-pot or crucible, holding about 34 lbs., made of a peculiar dark-gray clay. Before charging the crucibles they are gently heated to a red heat on an annealing grate, and then placed with covers of the same material upon fire-clay stands in the melting-furnace, and covered with coke, till furnace and pots are at a white heat. Each furnace holds 24 crucibles. These are kept covered by fresh supplies of coke as required, till the metal is thoroughly melted, which is known by its clear surface and motionless state in the pot. When ready, the crucible is taken by tongs from the furnace, and the steel is poured slowly into moulds prepared for its reception. The moulds can be opened, and the ingots taken out, and removed into the yard to cool, a few minutes after they have been cast. As soon as the pots are empty, the lids are put on and then are replaced in the furnace, a quantity of coke is put in, and the holes are covered. When the coke has burned down so as not to be higher than the pot-lids, a fresh charge of steel is put in and the former process is repeated for a second and a third time, after which new pots are necessary.

Another plan is Heath's process of melting, also adopted to a considerable extent. This consists in cutting the bars into pieces, placing them in the pots with a certain amount of charcoal, and, when brought to a melting heat, sufficient manganese is added to make the steel weldable. Steel thus prepared is particularly adapted for all purposes where soft welding is required. In some instances spiegeleisen is also added as a ready vehicle for imparting the manganese.

Tool-steel, sheet-steel, and steel wire are the chief classes into which cast-steel is manufactured.

For tool-steel the best ingots are selected. The ends of each being broken to determine its texture and temper, it is heated to a red heat, and drawn under the steam hammer to the sizes required.

For steel wire the ingots are roughly drawn under the hammer into billets 1¼ inch square, and sent to the rolling-mill, where they are passed at a red heat between grooved rollers, and reduced at one heating to a quarter-inch thick, and from 2 ft. run out to 70 ft. long. The rapidity of the rolls is such that, notwithstanding the partial cooling of the steel by lying on the floor, during its passage through the rolls it becomes reheated from "warm red" to "bright red" by their action. From the last pair of rolls, the rods (as they are now called) are coiled upon a drum about 26 inches in diameter, tied in bundles, and passed to the wire mill, where they are subjected to an annealing process and an acid bath, and are then drawn through steel plates while cold. These operations are repeated from three to five times, according to the fineness of the wire required. The wire used for the umbrella-frames, ranges from 13 to 15 wire-gauge numbers. For other purposes any degree of fineness can be obtained.

The process of annealing is as follows: The wire is placed, coiled, in large quantities, in a cast-iron vessel, actual contact with which is prevented by the insertion of bricks into cast-iron ribs. The vessel is closed, and very gradually brought, with its contents, to a red heat, at which it remains from 12 to 15 hours, when it is as gradually cooled.

To produce sheet-steel, large quantities of which are demanded for the steel-pen trade, the ingot is treated as before, but hammered to about ⅝ths of an inch thick. It is then taken to the rolling mill and passed through flat rollers while at red heat, till it is about 22 wire-gauge. In this state it is suitable for circular saws and kindred purposes. It is next subjected to the annealing process and acid bath, and then rolled in a cold state till it becomes hard, or, as it is technically called, "dense." The first annealing will permit the steel to be reduced to 30 wire-gauge. The annealing and bathing process are repeated as often as the steel requires softening and cleaning, till the desired sizes are obtained. This cold-rolled steel is turned to a variety of uses, such as clock and watch-springs, children's toys, etc.

Lumber Trade of Albany, N. Y.

IN the last thirty years the Albany lumber trade has made extraordinary strides. Instead of being confined to the Upper Hudson for its supply, lumber is now received in vast quantities from Canada and Michigan, also from Indiana, Ohio, Pennsylvania, and the Lake Champlain District. In 1841, all the lumber which was carried over the Erie and Champlain Canals only amounted to 449,095 feet. In 1871 the receipts, per canal alone, of sawn lumber and shingles were 446,125,-800 feet; nearly millions for thousands as compared with 1841. But in addition to this amount, there are the receipts by rail, of which no account is kept, but amounting to several millions of feet. These receipts are a little under those of 1870, but the sales of the year exceed in quantity and value those of any previous year. A year ago the stock of lumber was 90,000,000 feet, now it is only 70,000,000, an increased sale of 20,000,000 on account of stock. Again the sales of 1870 were estimated in money value at $9,774,093; for 1871 they will exceed $11,000,000. Some of the lumber dealers put the increase at even a larger figure, pointing to the fact that prices are at least ten per cent. higher on pine, and five per cent. on spruces and hemlocks.

Of the 450,000,000 feet of lumber received in the Albany market during 1871, about 100,000,000 feet was Canada pine, 100,000,000 Michigan pine, and the remainder from Ohio, Indiana, and Pennsylvania, and spruce and hemlock from Lake Champlain, Glenn's Falls, Fort Edward, and the vicinity. The Western Canada pine is carried down the Ottawa River to Montreal, then up the river St. Lawrence as far as Lake St. Peter, a distance of seventy miles, where the river Sorel, one of its tributaries, runs into it. The Sorel rises in the northern part of Lake Champlain, and is navigable the whole distance between the lake and the St. Lawrence, thus making an easy though a roundabout passage for the lumber to the lake, through which it passes to Whitehall, and thence by the Champlain Canal to Albany. But there is some talk of simplifying the route by cutting a canal due south from Montreal to the Sorel River, a distance of only twelve miles, the angle formed by the two rivers being so intensely acute. This would save at least 140 miles of navigation up the St. Lawrence and down the Sorel. The Eastern Canada lumber, from Toronto and Port Huron, all comes to market by way of the Oswego Canal to Syracuse, and then on by the Erie Canal to Albany. The Michigan timber comes by the Lake Champlain route and by Erie Canal from Buffalo. The cost of transportation from Oswego is about $3 50 per 1,000 feet of lumber; from Buffalo it is $5 50 per 1,000 feet. But the distance from Syracuse to Oswego is only 35 miles, as against 150 miles to Buffalo. The hemlock and spruce cut in the Champlain district, of course, come over the Champlain Canal.

Pumping Engines.

M. H. AUDEMAR, the able mining engineer of Blanzy Saone-et-Loire, France, has recently set to work, at the Shaft St. Marie, a pumping engine he has designed, and which raises in one lift, from the depth of 1,115 feet, a volume of 770 gallons per minute. The engine, of 250 horse-power, is placed at a depth of 984 feet from the surface, in a chamber excavated in the rock, and measuring 82 feet in length, 26 feet in breadth, and 23 feet in height. There are two engines coupled on the same shaft with one fly-wheel. On the extension of the piston-rods are placed the force-pumps, consisting of four horizontal plungers, which send the water into a common air-chamber. The engines are supplied with steam from boilers on the ground level. The steam-pipe is 7⅞ inches in diameter, and the loss of pressure is but very small. Leaving the air-chamber, the water is led up to the ground level by a conduit following the sides of the shaft, and which is supported by brackets built in the wall.

Elevating pumps in the lowest level of the shaft raise the water into subsiding reservoirs, where it leaves behind it the clay, mud, and gravel, that would prevent action of the force-pumps. The valves are so arranged as to reduce to a minimum the seat area, so that there may be only a slight difference between the upper and lower pressure at the moment of lifting. The valves are in cast-steel, and are made spherical at the point of contact with the seat. They are found to work without any shock, and operate noiselessly, although they make about 18 strokes a minute, a considerable speed for such a pump. The steady working of these pumps confirms the expectations they raised when first set to work, and M. Audemar has apparently solved with success, thanks to the bold means he has employed, a problem of which the difficulties are well known.—*Cor. Engineering.*

FIRE-AND-WATER-PROOFING FABRICS.—J. A. Carteron, of Lille, in France, proposes a method for fire-proofing fabrics. In this, sulphate of alumina, oleic acid, and alcohol are properly mixed and then allowed to settle, the surplus acid and alcohol are then poured off, and the precipitate is pressed into blocks, which can afterwards be dissolved in water.

IN one of the great industries of Paris, out of a hundred persons arriving at affluence, seventy rose from the lowest step of the ladder, twenty commenced in good circumstances, thanks to their fathers, six owing to their grandfathers. To four only fortune has been long in the family. In another city, eighty per cent. of the wealthy have been the true architects of their own fortunes during the past twenty-five years.

COMMUNICATIONS

TO CORRESPONDENTS.

We wish our readers to understand that, in freely publishing communications, we do not hold ourselves responsible for the opinions of our correspondents, inasmuch as we may occasionally publish views opposed to our own.

MESSRS. EDITORS:—I would respectfully submit for criticism the following. I have a device—a model canal—that I claim demonstrates the fact and solves the problem of cheap canal transportation. It consists in moving the water and floating the boats, instead of drawing them through the water. Fifty boats of one hundred feet each can be floated on each mile; they might be coupled as railroad cars are, and but few hands are needed to take charge of the same. The amount of power required to create and maintain a current would be trifling as compared with the method now in use. It is manifest a canal built and worked after this plan would increase many-fold the capacity over the present ones in use. You are at liberty to do as you see fit with this. Respectfully,

FRANK RANSOM.

BUFFALO, N. Y., Feb. 15, 1872.

MESSRS. EDITORS:—I think I have never read an official document that, in so small a compass, contained so much valuable information as the annual report of Commissioner Leggett, published in the last two numbers of the AMERICAN ARTISAN. His remarks and suggestions are, I think, invaluable, and it will be well to consider now that part which refers to the abolishment of the old form of Patent Office Report.

Mr. Leggett says:—"It is questionable whether the law has provided an adequate substitute." All with whom I have conversed, who in common with myself are interested, are clearly of opinion it is *unquestionably inadequate*, and that, while it would have been judicious to restrict the issue to those who were sufficiently interested to apply to the Patent Office direct for the Report, *and who were willing to pay postage on the same*, it was an injustice to inventors (and patentees who, under the old law, were furnished a copy of the year in which their patent was issued), and who have not only paid the Government for all their expenses, but have accumulated a fund in the treasury of $760,000, to cut off the only means of information on which they depended to direct their efforts. Why should not this fund—or so much as may be necessary—be expended to complete the series from 1868, under the judicious management of our present Commissioner?

No report issued from Washington ever was or will be so beneficial to inventors, and through inventors to the country, as the Patent Office Reports. An inventor cannot and dare not work in the dark as to what is doing in that department, and if he be poor he cannot, under the present law, obtain the desired information, as Mr. Leggett has very clearly shown; but he would pore over the old "Reports" with as much interest and profit as the lawyer over his "Digest," they were his lamp and guide, and I do most sincerely hope Congress will, on the suggestions made by Mr. Commissioner Leggett, reconsider that part of the Act of July, 1870, and give us again that which, with all its faults, was to inventors of priceless value.

If this accumulated fund is not to be used "for the advancement of the arts" (and in what better field than instructing inventors?), what is the purpose that it can be rightfully applied to?

I commend this valuable report to all interested for a careful reading, and hope it will result in a petition to Congress to complete and continue the Patent Office Reports. Yours respectfully,

JOHN GWYNN.

TIFFIN, OHIO, Feb. 10, 1872.

Screw and Rivet Manufacture.

From *Engineering*.

BIRMINGHAM abounds in screw and rivet manufacturers. Out of the numbers we may briefly describe the works of Messrs. Nettlefold and Chamberlain, where their patent process of manufacture is carried on. Besides their screwing-works in Broad Street, they have also other establishments in another part of the town, and wire-drawing works at Smethwick, where they manufacture wire for telegraph and other purposes besides what they employ at their screw-works. The screws manufactured by the firm are principally wood-screws, but other threads are also cut, and they manufacture a quantity of screws for stove work and for reaping-machines, as well as for other special purposes. The rivets made here are chiefly those adapted for light work, such as are employed by tinmen and coopers, and weighing from a few ounces to about 16 pounds per thousand. Up to a certain point the mode of manufacture of rivets and screws is similar according to the process here employed. The first part of the operation for both classes of work is to cut the wire into the proper lengths, and to form the head. This, in the case of small work, is all done by one machine, and at one operation. Where comparatively thin wire is employed, the coil is simply hung over a wire attached at one end of the machine, one end being placed between the jaws of a feeder, but where heavier wire is employed it is necessary to pass it through a straightener before allowing it to enter the machine. The feeder consists of two jaws, which close as they move forward, gripping the wire, and carrying it into the machine, but separating as they move backwards, preparatory to making a second bite at the wire. The proper adjustment of this feeder is a matter of no small importance, depending, firstly, upon the required length of the screw or rivet; and, secondly, upon the size and thickness of head required. The character of, and consequently the amount of metal required for, the heads of screws, especially those employed for ecclesiastical ornaments and other fancy work, varies so much that no especial rule can be laid down for guidance as to the additional length of wire that must be allowed for the purpose, and the proper setting of the feed motion of the machine is, therefore, a matter which experience alone can properly regulate. The machine having been properly adjusted for feed motion, and suitable dies inserted for the formation of the head of the rivet or screw, it is set in motion; a crank action causes the feeder to draw in the wire, with a proper proportion of excess wire for the formation of the head projecting in front. The jaws of the feeder now hold the wire rigidly, whilst an eccentric action projects the head die forward from the opposite direction, stamping or rather squeezing the projection wire in a head of the required shape and form at one operation. This done, a cutter, working sidewise from the machine, severs off the now finished rivet or screw stock, as the case may be. Another revolution of the machine causes a second rivet to be thrown out; and this goes on incessantly so long as the roll of wire lasts, the operation being perfectly automatic when once set in motion, and requiring but little attendance, so that one person is enabled to overlook several machines. Besides these horizontal machines, which will work with wire up to about one half-inch in thickness, there is also at these works a vertical or, as it is there called, an "upright" machine, which will take wire of a much greater thickness. For this the wire requires to be first cut into proper lengths by a suitable machine of simple construction. The machine consists of a bed-plate, on which is a receptacle for the lower die or holder. On either side of this there is an upright, between which works a stamper in a suitable guide piece, at the bottom of which is fitted the upper die for forming the head of the rivet, and motion is given to it by an eccentric revolving on a shaft above, and which is driven direct by a strap from the overhead motion shaft. It is fed by hand. In both these machines the heads are made without heating the iron. The heads to which we have hitherto been referring, so far as screws are concerned, are those which are round, and flat at the top, to be afterwards cut across for screw-drivers. Many screws, however, require to be made square-headed, for spanners, and these are generally forged by hand; but however neatly they may be made, it will always be found that there is a certain degree of irregularity in their shape which renders it necessary to pass them afterwards through a shaping machine. Besides the great expense of this, it is found that the heating and cooling of the iron, during the forging of the head, reduces its strength, and that the heads of such bolts will sometimes give way when subjected to a severe strain. The intelligent foreman of these works is just now perfecting a machine for pressing out square heads to bolts whilst the iron is in a cold state, by which not only will the work be done much cheaper, but the necessity for subsequent shaping, and the depreciation of the metal above referred to, will be avoided. From specimens which were shown to us, there would appear to be very little doubt but that this great object has now been successfully accomplished. As, however, the machine has not yet been patented, we are not at liberty at present to give any further details concerning it, or to state more definitely how the desired end is effected. The screw stocks having now been completed, the next process is to smooth down the heads, and to give them the proper size and form. The machine for this consists of a revolving holder, into which the end of the stock is firmly fixed, so that the head will revolve between two cutters shaped to cut it to the proper form. As soon as the machine is set in motion, the attendant draws up a lever which causes the cutters to close upon either side of the screw-head. These, however, are firmly set so that they will not approach one another beyond a certain point—otherwise this operation would have to be very carefully effected, and the result tested with calipers; and even then, with the greatest care, the screw-heads could not be so evenly made as they now are by these machines. After this, the stocks are placed into a hopper attached to another machine, from which, by a self-acting motion, they are caused to slide down a slotted incline, at the bottom of which is a revolving vertical barrel, with circular cuts at intervals down its side; into these cuts the screw-stocks

fall one by one, with their heads projecting above the top of the barrel. They are then carried round beneath a small circular saw, which cuts the nick in the head for the screw-driver, after which the stock is thrown out of the machine and carried away to receive the final operation of screwing. The threading machines—which are worked exclusively by women and girls—require great accuracy in their adjustment; but when once properly set, it is impossible that there can be any deviation in the thickness of the screws cut. The cutter consists of two parts—a die, against which the screw revolves, and a cutter, which is pressed by a lever against the opposite side of the screw; and these are first so set that they cannot approach within the proper distance of one another. The head of the screw is first fixed into a mandril head, where a driver-point enters the nick, and it is further firmly held in position by a set-screw. Of course, a good deal of knack is required in this branch of the manufacture to get the cutter always into the trough of the screw, and so as not to cut the thread; but the greatest nicety—which is only acquired by great practice—is required when the screws are gimlet-pointed. Of course, on this class of work the women are all paid by the piece; and whilst some will only earn about 8s. a week, others doing precisely the same kind of work will earn as much as 18s. or 20s. a week. The packing of screws in paper is all done by hand, and with the greatest rapidity, the screws being put down side by side, alternate head and tail, by the two hands working together, each placing a screw with the head outwards, and rising row upon row until the required number—generally a gross—is completed. They are then tied up and labeled, and are then ready for the market. It may be here remarked that the breaking-off of part of the heads of wood screws which not unusually occurs, is owing generally not to any error in making the screws, as might naturally be supposed, but more often in consequence of the wire having received a twist in the operation of drawing. This causes a strain in the fibers of the metal, which too often cracks open during the operation of gathering in the metal in forming the head.

Centenary of the First Lithographer.

THE people of Munich have been celebrating the centenary of Senefelder, the founder of lithography, and the ministers and leading people of Germany's most art-loving city have taken their share in the commemoration.

Senefelder was born at Prague, November, 1771, and died at Munich in 1834. He had just commenced the study of the law at Göttingen when his father died, and the *res angustæ domi* compelled the young man to do something for a living. His father had succeeded as an actor, and young Senefelder determined to try the same line, but utterly failed. He took to scribbling plays, and was more successful. Being often in press-rooms, he was led to observe the art of printing, and ultimately mastered it.

After several attempts—which somewhat recall Palifrey's efforts in another direction—to invent a plan for taking off impressions of what he wrote, he was, like too many other inventors, indebted to an accident for the accomplishment of his aims. One day, when he had polished a stone plate for etching, his mother asked him to write a washing-bill. Not a scrap of paper was at hand, so he wrote the bill on the stone with a sort of chemical ink he had made for himself. Some time after it occurred to him, on looking at the stone, that by means of aquafortis and water, he might etch the stone so as to leave the writing in sufficient relief for printing from it. The experiment succeeded, and so soon as he had brought this invention into practical form, he applied himself to the means of bringing it into operation, so as to gain a livelihood by it.

Being unable to raise the necessary funds otherwise, this energetic youth enlisted as a private of artillery as substitute for a friend, who gave him $200. However, it seemed that he was again doomed to disappointment. On reaching Ingoldstadt with a party of recruits, it was discovered that he was not a native-born Bavarian, and therefore was ineligible for service without a special license.

However, this excursion was destined, notwithstanding, to be the making of him. By the assistance of Sleissner, the Elector's bandmaster, whom Senefelder managed to interest in his scheme, his plans were tried, and the Elector sent him a hundred florins, and promised the printer an exclusive privilege of printing.

But many difficulties in the way of machinery and expense remained to be conquered, and Senefelder deserves to be commemorated if only for the indomitable pluck and resolution which he displayed in the pursuit of his darling object. One such example is indeed worth one hundred thousand precepts against despair. In 1799, when only twenty-seven, he obtained an exclusive privilege for Bavaria, and carried on a considerable business, employing his two brothers and two apprentices, and in 1809 he was appointed—on the occasion of a lithographic office being formed for a survey of the kingdom—inspector of the royal lithographic establishment, with a salary of 1,500 florins, and permission to carry on his private business. He enjoyed this office until his death in 1834.

New Filtering Process.

THE water-works of Dunkerque, in France, completed in 1870, include the application of a filtering process, arranged by M. Pauwels, the city engineer in charge of the works. The filtering system of Dunkerque is analogous to the self-cleaning filters established at Paisley by Mr. Thom, and in which the duty is equal to 27,500 gallons per 24 hours, with an area of 7,100 square feet.

The total thickness of M. Pauwels' filter is only 26 inches, arranged as follows:—

in.			in.
5 124	Formation	Bricks laid on edge	18·118
1·194		Tiles set in Portland cement	
5 900		Calais gravel	
5·900		Culm	
7 882		Filtering bed of fine sand	7·882
26·000		Total thickness in inches,	26·000

The 5·9 inch of culm in the formation is laid in three beds, in which the fragments decrease in size from the bottom to the top. This material has given good results, allowing the water to flow through, and being absolutely impermeable to the grains of sand which form the upper bed. The gravel, on the contrary, allows the sand to pass gradually, gets choked rapidly, and reduces the useful effect of the filter. The duty of the filter reaches the proportion of 8 cube meters to 1 square meter per 12 hours.

It is well known that in a certain number of localities the results of filtration have not been entirely satisfactory. M. Pauwels believes that he has overcome all difficulties by the combination he has adopted, that is, by the use of the beds of coal-dust under the layer of sand.

British Gun Improvements.

TWO recent English novelties in ordnance relate, the one to locomotive batteries, the other to the discharge of cannon by electricity. In the former the battery consists of a strong frame mounted on wheels running on rails, with a revolving turret or cupola clad with armor—viz., first, a thin skin, for resisting small shot and fragments of shells, and an additional thicker coat of armor for more than half the circumference of the turret. The turret may be armed with guns or mitrailleuses. In the other, the gist of the invention consists in improved electrical mechanism for discharging ordnance at sea; whenever by the motion of the vessel the gun attains the proper angle of elevation, a medium device or apparatus, dependent on the force of gravity, performs automatically and at the precise desired moment. It is also claimed to be applicable to field-guns.

Disintegrating Leather Scraps.

ON page 66, current volume of the AMERICAN ARTISAN, we gave a brief sketch of what purported to be an English method of disintegrating scraps of leather with a view to their utilization for various purposes. We find that such a process is an American invention, having been patented in this country June 29, 1871, by Mr. E. S. Hidden, of Milburn, N. Y., who is making arrangements to conduct the manufacture on a large scale. We are informed that the shredded material has been successfully applied for journal-boxes, and, quite a different use, has been employed as a substitute for curled hair in mattresses and cushions.

UTILIZING TIN SCRAPS.—Of late many projects have been brought out for utilizing the tin from waste tin scrap. In one of the most recent of these the shearings are steeped in a bath of hydrochloric acid until the tin is removed. The solution thus obtained is diluted with water, and a plate of oxydizable metal plunged into it to form a precipitate. This precipitate is collected and melted in a crucible, at the bottom of which the tin is deposited.

PNEUMATIC TELEGRAPHY.—The vibrations produced by intermittent pressure upon a column of air are a poor substitute for the pulsations of the electric wire. But some foreign inventors appear to have faith in the feasibility of this system of telegraphing, and one of them has received an English patent on a modification which consists in the adaptation of a barometrical tube to the purpose of telegraphy, and the indication of letters and figures by rises and falls of a liquid column.

ARTIFICIAL LEATHER.—The latest idea for making artificial leather is to fasten refuse hair fibers together into a sheet by the aid of siccative oils. The hair is spread in layers, then saturated with boiled linseed oil, or an india-rubber compound. When saturated, it is placed in a press between hollow steam plates, and submitted to pressure, the layers being heated during the pressure by steam forced through the plates.

AN inventor in St. Valéry-sur-Somme, France, has devised a substitute for ordinary gunpowder machinery. A knife and a pair of rollers are used for cutting up gunpowder cakes into cubes. The cutting edges on the rollers are sharp, and come exactly opposite each other, but without touching, the free space between the rollers being dependent on the thickness of the cake.

NEW AMERICAN PATENTS.

WE give, as follows, notices of some of the most interesting inventions for which Letters-Patent of the United States have recently been issued :—

SCROLL-SAW.—T. S. Greenman, Mystic Bridge, and C. A. Fenner, Mystic River, Conn.—*Feb.* 13.—The most noticeable feature of this invention is found in the use of a revolving frame supported on fixed tubes, and supporting the devices for straining the saw, so that the frame and its connections shall swivel freely around in any position without affecting the vertical motion or the strain on the saw.

LUBRICATING BOX AND BEARING FOR UPRIGHT SHAFTS.—J. P. Grosvenor, Lowell, Mass.—*Feb.* 13.—This apparatus comprises a box and vertical shaft-bearing constructed in such manner that the oil for lubricating them is raised, by the centrifugal force created by the revolution of the shaft, from an oil-chamber within and at the bottom of the box, to the point of application of them. Also, the bearing of the shaft formed upon the outer circumference of a projection, the periphery of which extends over the inner wall of the oil-chamber. Also, vertical passage-ways formed in the lining outside the periphery of the just-named projection, in combination with the latter and the suitably arranged oil-chamber.

STOVE OR RANGE KETTLE.—L. D. Lothrop, Dover, N. H.—*Feb.* 13.—This stove or range kettle has a smaller or auxiliary bail pivoted to its side and arranged in suitable relation with the main bail and the kettle-body. There is also claimed, in combination with the kettle-body and main bail the lesser or auxiliary bail, with a hollow or concavity provided in its top, arranged to receive the main bail when down, so as to cause it to hold the smaller bail outward or from swinging back against the kettle.

ROTARY ENGINE.—G. B. Massey, New York City.—*Feb.* 13.—In this novel rotary engine, the pistons radiate from the center of the cylinder and pass through packings peculiarly combined with a crank-shaped center-pin, allowing the piston-wheel to revolve on it at one end, while the driving-shaft is held rigidly at the other.

SEWING-MACHINE NEEDLE AND ITS CARRYING-BAR.—A. M. Mathues, Media, Pa.—*Feb.* 13.—This inventor claims the combination, with a needle-bar having a transversed pin in the needle-receiving orifice, of a needle having the upper part of its shank obliquely cut and rounded.

BURIAL CASE.—J. Weidenmann, Hartford, Conn.—*Feb.* 13.—This improvement in burial cases is constituted by an interior coffin and an outer case, with the space between filled with cement, or the like, poured or put in in a fluid or plastic state. The claim also covers certain novel features adjunctive to that just set forth.

STEAM-HEATER.—S. L. Wiegand, Philadelphia, Pa.—*Feb.* 13.—This invention consists in a radiator formed of nested chambers made of thin ductile material, so embossed or corrugated as to support each other laterally at numerous points. Also, in the combination of clamps with chambers formed of ductile metal, corrugated, embossed, or roughened. Also, in channels provided in the chambers for distributing the steam to the several corrugations, and for collecting and discharging the air and condensed steam therefrom. Also, in the combination of plates or other metallic conducting substance interposed between, and laterally supporting or bracing the thin ductile metal, corrugated, embossed, or roughened, against internal pressure.

DITCHING PLOW.—W. Burton, Lake, Ind.—*Feb.* 13.—Among the more noticeable features of this improvement is an adjustable mold-board composed of three or more sections. Also, the combination of an extended landside with an adjustable mold-board, made in two or more sections, and braces for adjusting the vertical and lateral pitch of the mold-board.

CARTRIDGE-SHELL FOR FIREARMS.—G. H. Dupee, New Haven, Conn.—*Feb.* 13.—In this improved cartridge-shell the rim is made by an annular groove formed in the shell, and the metal in the said groove and its vicinity, in the process of manufacture, left or made thicker, for the purpose of strengthening the shell at that point.

TAPE-MEASURE.—J. A. Evarts, West Meriden, Conn.—*Feb.* 13.—This invention relates to that class of tape-measures in which the tape is drawn into the case by a spring within, and it consists in a novel arrangement of a pawl acting by its own gravity to engage with or release the said spring.

MATTRESS.—J. J. Haley, Newton, Mass.—*Feb.* 13.—This mattress is formed with a main filling of sponge contained in pockets or compartments, such sponge being surfaced on each side by a layer of hair or other material interposed between the covering and the outer ticking, and tufted to such covering and the outer ticking, but not through the sponge filling.

MACHINE FOR FLINTING AND GLAZING LEATHER.—G. Crossley, Philadelphia, Pa.—*Feb.* 13.—This machine comprises a double-crank and compound lever or their equivalents, in combination with a fly-wheel, for the purpose of imparting a reciprocating motion to a suspensory and intermittent progressive rectilinear pressure on the tool.

COTTON-HARVESTER.—W. H. Irving, Philadelphia, Pa.—*Feb.* 13.—Aside from other novel characteristics of this machine, there may be more especially mentioned a frame of two box-like sections connected together, open at their inner sides or ends, and traversed at the bottom by endless bands, in combination with a series of vertical shafts and radiating arms or beaters. Also, toothed picking reels of peculiar construction, and arranged in suitable relation with each other upon opposite sides of the frame. Also, rods used in combination with the reels, and capable with the latter of being adjusted vertically upon the frame. Also, the combination with the rods and reels of strips carrying combs or equivalent devices, and strung upon the rods alternate with the reels.

HARVESTER-CUTTER.—L. Russel, Otsego, Mich.—*Feb.* 13.—The gist of this invention is found in a cutter-bar for reapers and mowers having the cutter made in sections, and each section provided with one or more dovetailed slots at the base, sliding over correspondingly dovetailed projections or bars on the cutter-bar, and each section held by a portion thereby acting as a spring-catch.

MANUFACTURE OF BOOTS AND SHOES.—S. T. Shaw, Marlborough, Mass.—*Feb.* 13.—This improvement includes a heel-lift and shank-piece made of a single piece of leather or other suitable material. Also, a shank-piece extending under the heel, to stiffen and strengthen the boot or shoe, where the outer sole is made in two pieces, or where the heel portion is omitted. Also, in a boot or shoe having its outer sole made in two or more pieces, a piece placed between the inner and outer soles directly under the joint, and extending under each portion of the outer sole.

MANUFACTURE OF PAPER.—J. H. Tiemann, New York City.—*Feb.* 13.—This process consists in introducing alum into paper by introducing the same into the vessel containing the paper-pulp, and causing it to come in contact, in solution, with and penetrate the fibrous matter, and then, by the addition of caustic lime, to form a precipitate within and upon the surface of the paper.

MANUFACTURE OF LEATHER.—C. J. Tennerholm, Quincy, Ill.—*Feb.* 13.—This is a process of liming hides or skins by means of the combination and use of lime, sal-soda, chloride of ammonium (or gas water), and water. The invention also embraces the bating of hides or skins by means of the combination and use of brimstone, potash, water, sal-soda, and chloride of ammonium (or gas-water). The invention also embraces the manufacture of leather by means of the several successive processes of liming, bating, tanning, and whiting by means of certain specified ingredients, used in appropriate relations, in carrying the tanning process into practice.

STEERING VESSELS.—The latest wrinkle in steering ships or other vessels relates to a transverse counterpoised rudder acting at right angles to the ship's course. The tiller-rope is carried directly to the wheel above, and a tiller-sheave is provided. There is an adjoining counterpoise weight or regulator which has rods with screwed tops for nuts to raise or lower and fix the weight. Iron plating is secured inside the ship, to which a beam carrying the regulator and sheave and a rudder-case are bolted. This rudder works through the sides of the ship on a trunnion, and a small cog-wheel throws gearing with toothed sectors and the counterpoise weight or regulator to the opposite side.

New Mode of Catching Fish.

A FISHERMAN at Alton, Ill., who is evidently something of a hydraulic engineer, recently took a wagon-load of fish in the following manner :—He cut two holes in the ice some distance apart, and pumped the water from one hole and ran the current into the other. This created a vacuum at the first opening, and an artificial current in the water under the ice, setting toward the hole where the pump was in operation. The fish in the lake were so benumbed by the cold as to be powerless to resist the current, hence they were floated directly into the opening of the ice, where they were scooped out by the thousand.

Future of Agricultural Machinery.

IT would be idle to fancy that we have attained the *ne plus ultra* of perfection in agricultural engineering; on the contrary, we may safely predict that, as the demand for food presses upon the resources of the land, men of enterprise and of mechanical genius will invent machines compared with which those at present in use will be considered rude and barbaric.—*N. Y. World.*

The Positive-motion Loom.

THE gold medal of honor awarded by the American Institute in 1869 to James Lyall, for his positive-motion loom, has just been placed in the hands of the recipient. This loom, aside from its more prominent use in weaving wide fabrics, has been adapted to the weaving of corsets, and has also had dress shuttle-boxes provided in connection with it to allow of changing the shuttles; further changes are also being made to adapt it to many varieties of weaving.

METAL MARKET.

[*Corrected weekly for the "American Artisan."*]

NEW YORK CITY, Saturday, Feb. 24, 1872

IRON.	
Pig, Scotch, No. 1 (cash), per tun	$33 00 @ 35 00
do. American, No. 1 (cash)	35 00 @ 36 00
do. do. No. 2	33 00 @ 34 00
Swedish, ordinary sizes	105 00 @120 00
Common	72 50 @ 77 50
Refined	77 50 @ 85 00
Rods	82 50 @120 00
Horse-shoe	95 00 @ — —
Hoop	100 00 @145 00
Scroll	100 00 @125 00
Nail-rods, per lb	— 6¾@ — —
Spring	— 7⅜@ — —
Tire	— 7½@ 8 —
STEEL.	
Bars, best cast, warranted, per lb	— 18 @ — 19½
Sheet, do	— 16 @ — —
do. second quality	— 15½@ — —
do. third quality	— 12 @ — —
Saw-plates, circular	— 20 @ — 30
Double-shear, warranted	— 18 @ — —
Single do	— — @ — —
Montague & Co. (cast bars)	— 15½@ — —
Machinery, round	— 11 @ — 13
German, best	— 11 @ — —
do. goat	— 10 @ — —
do. eagle	— 9 @ — —
Blister, warranted	— 14 @ — —
do. common	— 10 @ — —
Jessop & Sons', common	— 17 @ — —
Double-refined	— 26½@ — —
Stone-ax shapes	— 26½@ — —
ZINC.	
Mussulman and American, per lb	6½ @ — 9
Solder, per lb	— 22 @ — 23
Antimony	— 16 @ — 17
Spelter	— 7 @ — 7½
Copper, old	— 17 @ ——
Brass, do	— 14 @ — —
Nails, roofing, per keg	7 50 @ — —
do. do. tinned	12 50 @ — —
LEAD.	
American, per 100 lbs	7 50 @ 8 00
German	7 50 @ 8 00
Bar	8 50 @ 9 00
Pipe and Sheet	8 50 @ 9 00

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OF THE

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Messrs. BROWN, COOMBS & CO. are prepared to furnish to persons residing at a distance from New York—free of charge—*written opinions* as to whether Inventions contain any features of patentable novelty; to do this they simply require a sketch or rough model of the Machine or other Invention that is supposed to be new, together with a brief description of the same; and as soon as possible thereafter a letter of the best advice is mailed to the person desiring the information. These opinions are formed from their own mature experience, and may generally be relied upon. In some few instances, however, it may be desirable to have a *preliminary examination* made in the United States Patent Office in Washington, in which city Messrs. BROWN, COOMBS & CO. have a *Branch Office* for the transaction of such business as can only be satisfactorily performed in that city. For this extra service the small fee of $5 is payable in advance.

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The new Patent Law removes all restrictions which have heretofore existed against Canadians and other foreigners, except as to the filing of Caveats. Inhabitants of Canada may now obtain Patents by payment of the same Government fees as are required from American citizens.

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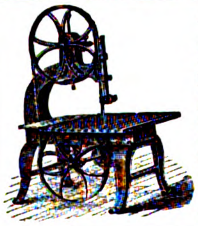

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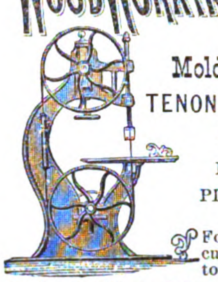

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ENGRAVINGS OF NEW INVENTIONS.
WE would call the *special attention* of INVENTORS and PATENTEES to the advantages which must result from having engravings of new machines, tools, etc., published in the AMERICAN ARTISAN. The illustrations shown in the present number are fair specimens of the skill and taste of our artists. We are prepared to execute such engravings *at short notice* and *very moderate prices*—in fact, we require only the mere cost of the engraver's labor, charging nothing for a large amount of space devoted to descriptive details, and (whenever requested) we shall subsequently send the engraved blocks to the inventor by express, for use in circulars, handbills, or other purposes.

None but ORIGINAL illustrations—preferably executed by *our own engravers*—will be published in the AMERICAN ARTISAN. Distant patentees desiring to have their inventions illustrated and described in our columns, should at once send us a small model of their machine, by express (prepaid); or mail a good photograph, together with their LETTERS-PATENT, to our address. We will then promptly examine the same, and return a reply, stating the precise expense of the engraving, the payment of which will be always required in *advance*. Address models, documents, etc., for the above object, as follows:—
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VOLUME XIV. New Series. | NUMBER 10. | NEW YORK, MARCH 6, 1872. | $2 00 PER ANNUM IN ADVANCE. SINGLE COPIES, FIVE CENTS.

CONTENTS OF THIS NUMBER

[Illustrations are indicated by an asterisk.]

McBeth, Bentel & Margedant's Univresal Wood-working Machine.

THE universal wood-worker herewith illustrated has, we are informed, been introduced with very profitable results into many of the most extensive and best-managed manufactories in the country—such as sash, door, and blind factories, furniture and cabinet-making establishments, carriage and wagon shops, and car-building works. Among these latter is the Barney & Smith Manufacturing Company, of Dayton, Ohio, the managers of which state that each of three of these machines which they have had in use for some time has paid for itself in the course of four months' use. The machine is made wholly of iron and steel, and is furnished with a "sticker" attachment to plane one, two, three, or four sides at one operation. It may therefore be run with five heads, one on the front and the others on the sticker side, for the several purposes for which the sticker or molding devices are properly employed. The parallel feed has been recently improved, and is now claimed to be superior to any other now in use. Among other practical improvements in the arrangements of the parts is that by which the outer side-head is so applied that the belt pulls against the boxes instead of against the cap, as is ordinarily the case with other "stickers." By this means the side-head is made steady, and a superior smoothness of cut is secured. The drop of the sticker-bed is made greater than was formerly thought sufficient, the depth in the present machines being eighteen inches.

Omitting especial mention of the details of construction, the manufacturers furnish the following description of the more essential features of the machine, the engravings representing the two opposite sides of the machine:—

Fig. 1

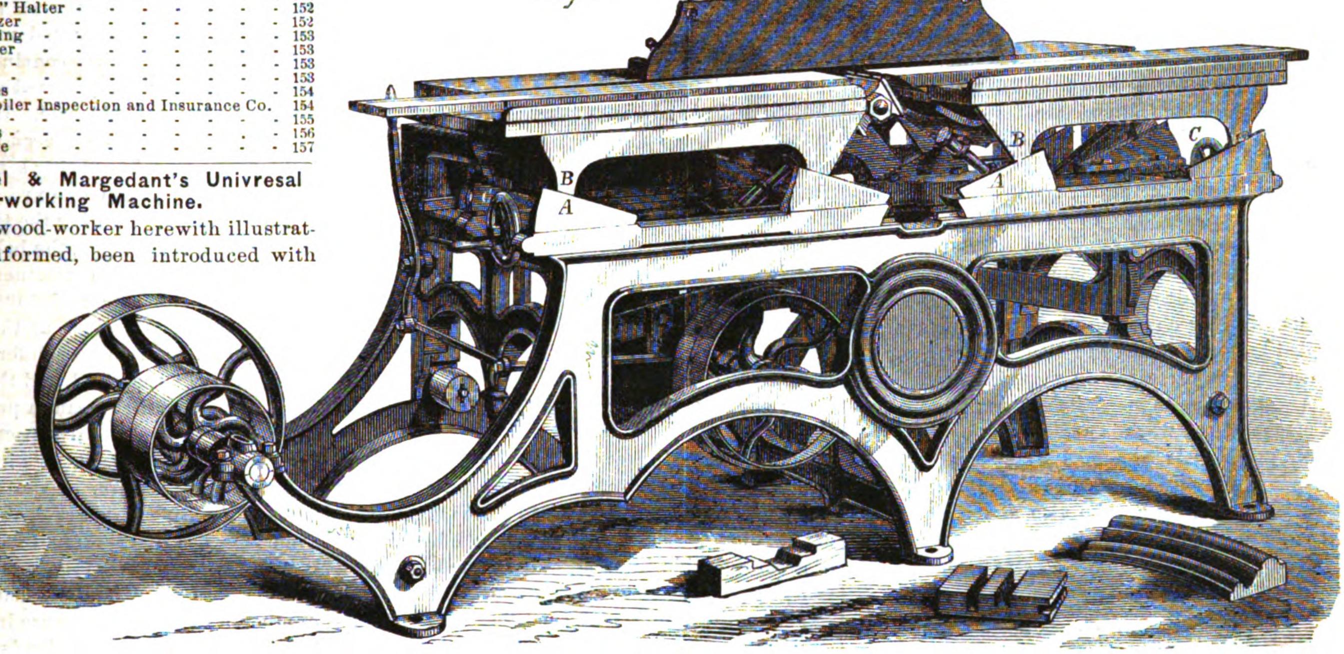
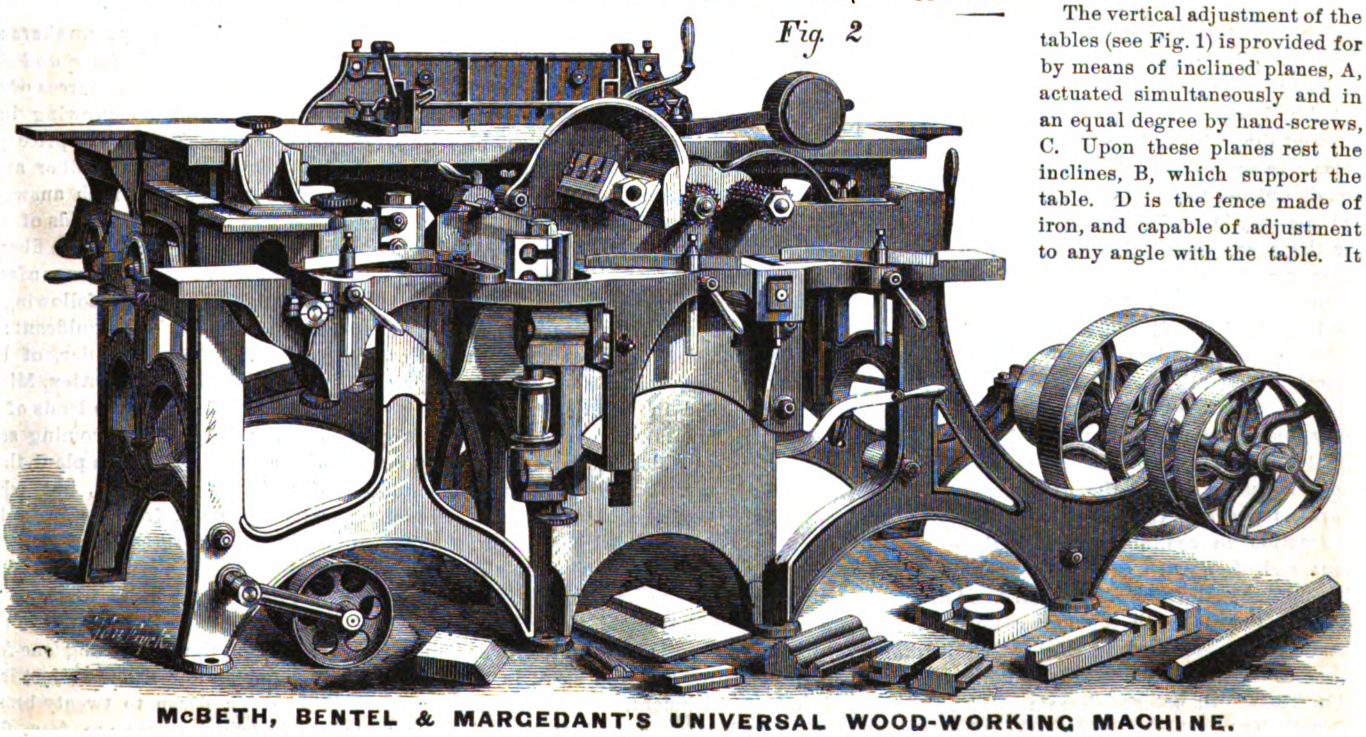


Fig. 2



McBETH, BENTEL & MARGEDANT'S UNIVERSAL WOOD-WORKING MACHINE.

The vertical adjustment of the tables (see Fig. 1) is provided for by means of inclined planes, A, actuated simultaneously and in an equal degree by hand-screws, C. Upon these planes rest the inclines, B, which support the table. D is the fence made of iron, and capable of adjustment to any angle with the table. It

will be seen in Fig. 1 that there are two independent tables, one on each side of the cutter-head, so that the piece to be planed rests on a solid surface on each side of the cutter-bits, and is thus planed out of wind. By adjusting the fence properly, any bevel may be planed.

The sticker-side of the machine, shown in Fig. 2, is provided with boring, routing, and other attachments for performing the following varieties of work, to wit:—Squaring, planing out of wind, beveling, cornering, rabbeting, gaining and plowing, planing tapered sticks, gaining 4½ inches in width by 3½ inches in depth (done at one cut), gains cut so close to others as to leave only a mere film of wood between them, plowing and gaining with the same cutter-head, gaining at different angles, glue-joints of newel-posts, mitering, tonguing and grooving, rolling-joints, table-leaves, straight molding (several specimens in hard and soft wood), circular and elliptical molding, raised paneling (the panel being raised on both sides of the piece at one operation), journals for agricultural machinery, picket-pointing, gaining cuts made in one operation for journal-boxing of different shapes, routing for bed-post irons, window-sash, light molding, etc. There are claimed for this apparatus the advantages of ability to perform a wide range of work, otherwise requiring different machines costing far more; great ease of adjustment, accuracy in operation, capacity to plane either light or heavy stuff, and to plane out of wind and finish at the same time; economy in bench-work obtained by its use, and convenience in this, that by changing the heads it is readily adapted to any required function, so that the common necessity for carrying material to different parts of the shop to meet the exigencies of different stages of the work is avoided.

This machine is protected by several patents, and is manufactured by McBeth, Bentel & Margedant, Hamilton, Ohio, who also manufacture the universal boring machine, illustrated on page 406, Vol. XII., of the AMERICAN ARTISAN, and also an improved horizontal boring machine.

The Porosity of Cast-iron.

THE crystalline structure of cast-iron renders it peculiarly susceptible to leakage by the passage of liquids and gases through its substance. The former require pressure to force them through the body of the cast-iron, while the latter are assisted by heat. A familiar example of the passage of water through cast-iron is that of the hydraulic press. In some cases this leakage is very severe, and diminishes the working power of the apparatus in a very large degree. Of course the castings for these presses require to be run in a special manner, and the iron used should be of as fine a grain as possible. They should be cast with a good head of metal, and, where possible, under pressure. In cylinders of large size, and consequently of great thickness, the run of metal should be continued after the proper quantity has apparently been admitted into the mold. The metal should, moreover, be pressed or rammed into the mold, so as to render the casting as sound and close as possible throughout by supplying the contraction in cooling. Without these precautions, and often with them, the iron will sometimes prove faulty near the waste head of metal. This was the case with the first cylinder cast for the large presses used in raising the Britannia tubular bridge. The internal diameter was 1 foot 10 inches, the diameter of the ram being 20 inches; the cylinder was 6 inches thick, its external length being 9 feet 1½ inches, and the length of the stroke 6 feet. The weight of the finished press was 13 tuns 16 cwt.; but, on account of the great head of metal requisite in such castings, 21 tuns of iron were run into the mold.

The first cylinder was cast bottom upwards, and, notwithstanding that every precaution was taken to feed the mold for many hours, it proved faulty. The cylinder was turned and finished externally and internally, but, on cutting off the waste head of metal at the bottom of the press, a spongy hollow space was found in the center of the metal capable of containing upwards of a pint of water. This cylinder was consequently rejected, and the next one was cast with the bottom downwards in its natural position. By this means the most solid metal consequently occurred at the bottom of the press, and the more porous metal at the top. To condense this as much as possible, a head of nearly 7 tuns weight was run on the top and afterwards cut off; the metal was fed to the mold for six hours after the casting. But with all these precautions the press proved to be leaky at the top. The remedies prescribed by Mr. Edwin Clark consisted in adding a second leather collar beneath the original one; in hammering the cylinder, and in forcing into the pores of the metal a thick gruel made of oatmeal and sal-ammoniac. The filmy particles of the oatmeal were thus mechanically fixed in the pores by the corrosion produced by the sal-ammoniac. Instances have occurred in practice when hydraulic cylinders of great size have been made of wrought-iron with external rings of the same metal shrunk on them. These of course come expensive, and as cast-iron from its very nature will leak under pressure, the best thing appears to be to dose it well with Edwin Clark's gruel.

The passage of gases through the pores of cast-iron, to which we have referred, is quite another matter, and refers principally to close stoves made of that metal. The question involved here is one of great scientific interest, and is important in a sanitary point of view. We are most of us familiar with the unpleasant condition of the atmosphere in a room heated by a close stove. It was, however, on the Continent—where this method of heating apartments is extensively adopted—that the practical bearing of the question was first discussed, and we are indebted to Dr. Carret, one of the physicians in the Hôtel Dieu in Chambery, for originally bringing it under notice. That gentleman, a few years since, drew the attention of the Academy of Sciences to the subject in a series of papers, in which he dealt with the evil consequences of the use of cast-iron stoves. Little interest, however, was excited in the matter at the time, but General Morin subsequently brought the matter forward with better success. Dr. Carret plainly denounces cast-iron stoves as an absolute source of danger to those who use them, and he bases his denunciations upon the following somewhat conclusive facts:—During an epidemic which prevailed in Savoy, Dr. Carret observed that all inhabitants who were affected by it used cast-iron stoves which had recently been imported into the country. On the other hand, he observed that all those who used other kinds of stoves or adopted other modes of firing escaped the disease. Another circumstance bearing on the same question occurred in the Lyceum of Chambery, where an epidemic of typhoid fever broke out. This outbreak is regarded by Dr. Carret as being influenced by a large cast-iron stove in the dormitory of that establishment.

General Morin endorsed Dr. Carret's statements and opinions, and laid before the Academy of Sciences the results of some comparative experiments which had been performed by the doctor and which supported his theory. He had a room heated to 40° Cent. by means of a wrought-iron stove, and after having remained in it for an hour he perspired freely, had a good appetite, and felt no sickness whatever. Similar results attended the use of an earthenware stove, but very different were those which followed half an hour's confinement in the same room warmed to a similar temperature by a cast-iron stove. Here the appetite failed, and an intense headache and sickness were brought on. MM. Deville and Troost, both eminent physicists and investigators, have established that both wrought and cast iron—the latter in an eminent degree—become pervious to the passage of gas when heated to a certain temperature. They have been unable to state the quantity of oxyd of carbon which may, as they suppose, transude from a given surface of metal. They have also shown that the air which surrounds a stove of cast-iron is saturated with hydrogen and oxyd of carbon. They conclude that cast-iron stoves when sufficiently heated absorb oxygen and give issue to carbonic acid. In his lecture-room at Sorbonne, M. Deville placed two electric bells, which were capable of being set in motion by the diffusion of hydrogen or oxyd of carbon in the room. Soon after lighting the two cast-iron stoves in use in the apartments, the bells began to ring, thus illustrating the correctness of his theory, and showing the danger of stoves of this metal.

We have thus looked at the question of the porosity of iron from two different aspects. The first concerns mechanical, and the second sanitary engineers. The first means a purely professional, the second a semi-social aspect. In either case, the circumstances are interesting and important, and the remedies are, in the one, to fill up the pores of the iron with gruel, and in the other to avoid the use of cast iron in close stoves. The latter question probably affects France more than it does England, but, inasmuch as a great number of cast-iron stoves are in use in our midst, it behooves our sanitary friends and the public to take this matter into serious consideration.—*Mechanics' Magazine.*

The English Paper-makers:—Epilobium.

IN the London *Engineer and Mechanics' Magazine*, we find that new sources of paper supply are sought from plants growing in Egypt, Japan, Jamaica, etc. £10 is the price per tun paid for plants having a textile fiber and delicate stems, the description of which answers to *Epilobium*, known in the northern wilds of the United States and Canada as *fireweed*, the fiber of which is said to be next to silk for the manufacture of paper.

In this connection the following extract from the *Evening Wisconsin* is significant:—

"Hon. Rutger B. Miller, of Utica, N. Y., has written a letter to Hon. Alex. Mitchell, of Milwaukee, predicting that the lands of the State burned over last fall will, the coming season, be covered with a species of cotton plant, the botanical name of which is Epilobium, but which is vulgarly called fireweed, from its springing up spontaneously upon evergreen timber lands that have been burnt over. Mr. Miller saw hundreds of acres of this plant in the north woods of New York. The plant is perennial, and grows to the height of four to six feet, the stem being one-fourth of an inch in diameter, and some two feet from the top, putting out a dozen to twenty branches, upon each one of which there are from fifteen to twenty

pods, that in August open and display a white fiber, essentially like that in the boll of the cotton plant. The seeds are very small and very numerous, but, unlike those in cotton, require no ginning process to separate them from the fiber. The plants grow very close together, and upon poor or rich soil, and in any climate from forty degrees north to the Arctic circle. It has been found in nearly all the Northern States. Its southern limit of growth is the northern limit of cotton, and this fact, together with the similarity of the plants, causes Mr. Miller to think that they are substantially one and the same.

"A specimen of the fiber of this fireweed, or Epilobium, was inclosed in the letter referred to, and an examination of it shows it to be very similar to cotton, though not quite so long as that. Mr. Miller subjected it to several tests, which proved it capable of being used for the same purposes as cotton. He made candle and lamp wicks out of it, and ropes which bore as much weight as cotton ropes of the same size. Carded and spun, it made excellent yarn, from which a stocking was knit. It will make good batting, and the finest of paper, being almost equal to silk for this purpose."

PATENT-LAW CASE.

UNITED STATES CIRCUIT COURT.—SOUTHERN DISTRICT OF NEW YORK.

Double Use.—Judgment not Invention.

H. Sawyer vs. S. M. Bixby and C. Tucker.

THE judge's decision explains clearly the nature of this case.

WOODRUFF, *Cir. J.*—The complainant alleges that the defendants have infringed a re-issued patent granted to him Oct. 1, 1867, for "a new and useful improvement in putting up powders, etc."; and the claim contained in the specification annexed is in these words :—" What I claim, as a new article of manufacture, is a package or case which, when made with distributing holes and filled, is cemented by the wax or wafer, as set forth."

The specification and the specimen of the manufacture produced show that what the plaintiff claims as an invention is a small cylindrical box, perforated at the end after the manner of a pepper or sand box, for the purpose of conveniently and evenly distributing the powder contained within it when put to use, and the closing of these perforations by wax or wafer, or paper pasted or made to adhere by mucilage or some glutinous substance, for retaining the powder when sold and transported by the manufacturer, dealer, or customer, the wax or wafer being removed or the paper punctured when it is desired to use the powder.

I am decidedly of opinion that in this device there is no patentable invention.

Pepper-boxes, sand-boxes, dredge-boxes, and spice-boxes, either of which are exactly adapted to the distribution of powder of any kind, are not new and are not claimed to be new. In construction and effect they are substantially alike, and in mechanical structure identical with the plaintiff's cylindrical box, perforated at one end for the distribution of the powder. In respect of distribution, the plaintiff employs no new means and produces no new result.

The closing of packages of various forms, and of bottles, by wax or wafer, or pasting of paper made to attach itself by the use of gum or other adhesive material, is no more new than the other, and, when these or either of them are applied to the openings in the plaintiff's boxes, they produce no new result. They close the openings, and that is all; they are old means, and produce their old and obvious well-known result.

In combination there is no other effect; each performs the same office, in the same manner as it does when employed for any other purpose, and precisely as it must whatever be the form of the package, or the particular use to which the package is applied. The employment of these instrumentalities in putting up packages for transportation is, therefore, the exercise of judgment in selecting, not of invention, or devising, or combining. At most, it consists in applying old devices to a new use, which, when it involves no new means and produces no new effect, is not patentable, notwithstanding it may be useful to combine the two results by uniting the two instrumentalities.

But this is not all. The proof shows that, long before the plaintiff's supposed invention, paper-boxes and sand-boxes with a perforated end were not only used for the convenient distribution of their contents, but they were put up for transportation and sale with the perforations covered by thin paper pasted thereto, to be removed or punctured when actually used.

I find no ground upon which to sustain the claim of the plaintiff to any decree herein. The bill of complainant must be dismissed with costs.

For complainants, Cochran & Todd; for defendants, C. A. Durgin.

How Steel is Made.

THE iron used for conversion into steel is of Swedish origin, and is received in bars 3 inches wide, ⅝ of an inch thick, and about 12 feet long. These, after being straightened so as to lie evenly, are placed in the converting furnace, which consists of two rectangular vessels, technically called "a pair of pots," made of silicious freestone, capable of enduring great heat without change; in dimensions 12 to 14 feet long, 3 feet 6 inches wide, and the same in depth. They are supported upon a depth of 4 feet of solid masonry, the top, of course, being of firebrick, to prevent settlement, which would crack the pots, admit air, and spoil the conversion. Upon this masonry are constructed transverse or sleeper walls of fire-brick, 10 inches thick and 10 inches apart, upon which the pots rest, the brick divisions forming flues underneath. The pots are placed parallel to each other, but 18 inches apart; the space between them is divided into flues, corresponding with those underneath, extending up the sides and ends of the pots into the fire-brick vault which covers the whole. This vault has an arched opening or man-hole at each end, for charging the pots with iron, or taking out the charge when converted into steel. During conversion, they are bricked up and plastered with clay. There is also a small opening over each pot, through which bars can be put. Out of the vault rise three chimneys on each side, opening into a large cupola. The fire-grate is under the middle flues and the whole length of the pots, with a strong metal door at each end, kept closely shut, except when being charged. Each pot has a stratum of charcoal evenly laid on the bottom, above which a layer of bars is placed, and covered half an inch deep with charcoal; bars and charcoal are thus laid alternately until the pot is nearly full, and finished off with a thicker covering of charcoal over the top. The pots when filled are covered over with five inches of "wheel swarf," which contains iron and steel in minute particles, and, becoming partially fused when hot, perfectly protects the steel underneath from the action of the air. Each furnace has a five-inch opening through the walls and into the center of one end of the pots, through which two or three of the top bars project, the opening being filled up with fine ashes, well rammed to exclude the air. The fire, gradually raised to great intensity, is kept up for six or eight days. A furnace holds about 16 tuns of iron, and is considered to be well worked if 14 to 16 heats are got out in a year.

When the conversion is supposed to be nearly complete, a top bar is drawn, and, when cold, is broken; its condition shows the state of the whole, and the fire is regulated accordingly. A second or third bar is subsequently drawn, and when the conversion is considered to be complete, the fire is allowed to go out. In four days the man-holes are opened to hasten the cooling, and in four more the steel, still hot, can be taken out. A full furnace charge is called a "heat of steel," and, according to the degree of carbonization required, is called "a spring heat," "a cutler's heat," "a shear heat," "a file heat," or "a melting heat." It should be premised that these terms do not apply to the "temper" of the steel, but to the length of time in the furnace.

The bars are now broken and sorted by experienced workmen into the various tempers; the hardest are laid aside for melting, and the softer hammered into shear or spring steel. Those required for shear-steel are broken into lengths of about one foot; are next laid upon each other, three or four together; then heated in a furnace to "welding heat," and drawn under the hammer to the size intended. It is then "single shear" steel. If again broken, heated, and hammered, it becomes "double-shear" steel, an extra quality used for best table cutlery and other first-class purposes. Spring-steel is made from bars passed at a red heat between grooved rollers until reduced to the particular size required. Shear and spring steel are the chief if not the only qualities manufactured direct from the converting furnace.

Sulphur from a Waste Product.

IN a new English process for obtaining sulphur from sulphureted hydrogen, the sulphureted hydrogen is caused to react upon oxyd of iron or of manganese by injection into water holding the metallic oxyd in suspension; and atmospheric air is then injected, whereby a mixture of metallic oxyd with free sulphur is produced. Into this mixture more sulphureted hydrogen is sent, and the product is then treated with air as before. These alternate treatments are repeated until the mixture contains a very large proportion of free sulphur, which can be separated by a variety of ways. Soda and potash are manufactured by forming sulphides of sodium or potassium, decomposing these by carbonic acid, and treating the resulting sulphureted hydrogen as above described. What is known as "alkali-waste" is also decomposed by any suitable acid or by steam, and the resulphureted hydrogen treated as aforesaid. The invention is also applied to nascent sulphureted hydrogen.

IT is said that the Ecole Polytechnique of Paris, hitherto a civil and military college, is to become a part of the Department of Public Works, and to train only civil engineers and chemists. The military pupils will be transferred to the Ecole de St. Cyr, in connection with which military schools are to be established in various parts of France, and to give instruction to children of French soldiers killed in the late war.

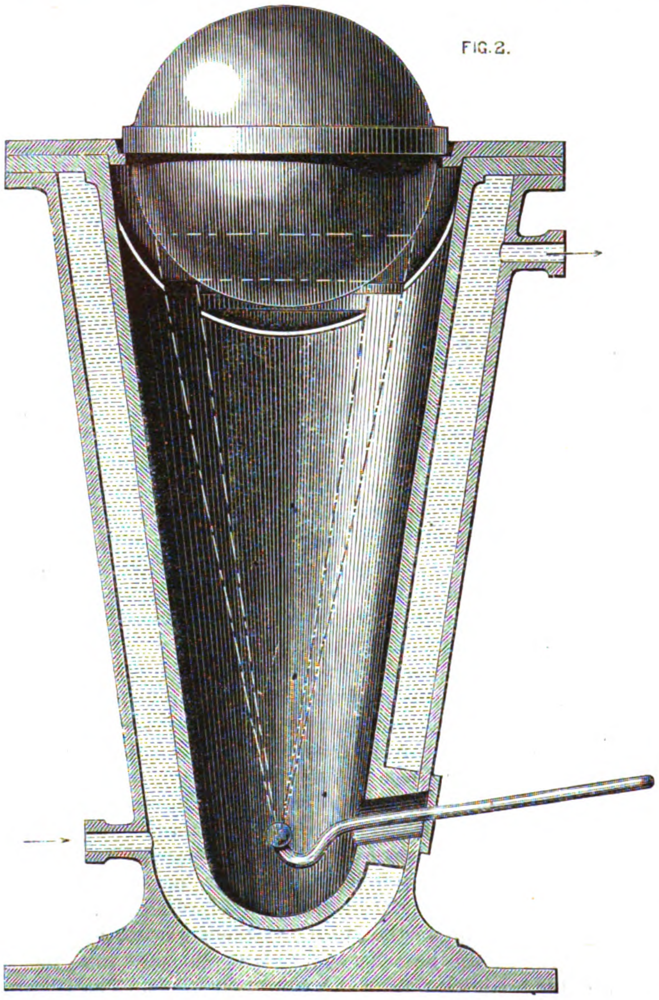
RADIANT HEAT TRANSMITTED BY INCANDESCENT SPHERICAL BODIES.

BY CAPTAIN JOHN ERICSSON.

[From *Engineering*.]

THE question whether equal areas at different points of the solar surface transmit equal energy towards the earth has not been satisfactorily answered. We have seen in the previous articles relating to radiant heat that the author of "Mécanique Céleste," finding by observation that equal areas do not transmit equal energies (the central regions transmitting, in opposition to his reasoning, much greater intensity than those near the border), explains the matter by showing that the solar atmosphere retards the passage of the rays, causing a great diminution of the energy of the radiant heat projected towards the earth. It but seldom happens that questions of a cosmical nature admit of being decided by actual experiment, the present being one of the rare instances in which practical tests may be resorted to. Evidently, if the great diminution of energy towards the border demonstrated in the work adverted to is caused solely by the retardation offered during the passage of the rays through the atmosphere surrounding the photosphere, the receding surface of an incandescent spherical body of any size whatever, *not* surrounded by a retarding medium, will transmit its radiant heat undiminished. The illustration annexed shows a mechanical device by means of which it has been clearly demonstrated that the absence of a retarding medium round an incandescent sphere does not affect the diminution of energy resulting from the obliquity of the heat rays projected by the receding surface. Fig. 2 represents a vertical section of a conical vessel surrounded by a water-jacket, and, in other respects, similarly constructed to the one delineated in the preceding article on radiant heat emitted by inclined disks. The top flange, however, of the vessel here presented, is provided with a groove, the bottom of which supports a solid sphere of cast-iron, in the manner shown by the illustration. Below the sphere are inserted two semispherical screens of different diameter, an annular opening being thereby formed between the same. Supposing the sphere to be heated before being placed in the position shown, it will be perceived that the thermometer at the bottom of the conical vessel will only receive the radiant heat which emanates from the zone contained within the dotted horizontal lines shown in the drawing. The heat rays from this zone, converging in the center of the bulb, are indicated by dotted radial lines. It is evident that, by changing the dimensions of the screens, zones covering *equal areas*, but occupying *different* positions, may be made to radiate towards the thermometer, and that, by this means, the radiant power of any portion of the sphere may be accurately ascertained. We are accordingly enabled to test the correctness of the assertion that, "but for the intervention of the sun's atmosphere, the receding solar surface would, owing to the increased number of rays within a given section, produced increased intensity. It may be urged against our device that atmospheric air intervenes between the incandescent sphere and the recording thermometer, but a moment's consideration will show that the consequent retardation is practically inappreciable. The retardation of the sun's rays in passing through the depth of 28,800 feet of atmospheric air of maximum density on the ecliptic, it has been demonstrated in previous articles, amounts to 0·207, while solar intensity at the boundary of the atmosphere is somewhat under 85°; hence the loss of radiant heat will scarcely reach 17·5° Fahr., notwithstanding the great depth of atmospheric air penetrated. The radiant heat of our experimental apparatus being transmitted through a depth of less than 2 feet, we may, without material error, assume that no retarding medium surrounds the experimental incandescent sphere. The principal features of our apparatus having thus been explained, and the method of solving the problem under consideration pointed out, we may now proceed to consider the result of the experiments which have been instituted. In order to facilitate comparison, the lower part of the sphere visible from the center of the bulb of the recording thermometer (see Fig. 6), has been divided into four zones, A, B, C, and D, containing equal areas. It will be evident on inspecting the arrangement represented in Fig. 2, that no part of the surface of the sphere, excepting that contained within the dotted parallel lines, is capable of radiating toward the thermometer, all the rest being shut out by the semispherical screens. Obviously the latter can be so proportioned that the radiant heat from any part of the lower half of the sphere may be projected towards the bulb. Figs. 3, 4, 5, and 6 show the arrangement of screens adopted in our experiments, by means of which the radiant power of each of the zones has been ascertained. The dimensions of the several screens have been determined by drawing radial lines from the center of the bulb of the thermometer to the points where the termination of the zones intersect the circumference of the sphere. The subject will be most readily understood by referring to Fig. 4, which exhibits zone C. The screens being made to terminate in the radial lines, *p*, *g* and *q*, *g*, it will be seen that an annular opening, *p*, *q*, is formed, permitting all heat rays to pass which are projected from the zone, C, in the direction of the bulb of the thermometer. A similar arrangement permits the radiant heat from zone, B, in Fig. 5, to act on the thermometer. Referring to Fig. 3, it will be found that only one screen, perforated in the center, is required to shut out the radiant heat from the three upper zones, C, B, and A; while in Fig. 6, the radiation from the three lower zones, D, C, and B, is shut out by a single central semispherical screen, the circumference of which is defined by the radial lines, *m*, *k*. It is proper to observe that, although the several screens are represented by single lines in the diagram, they are in reality composed of double plates, a fire-proof non-conducting substance being inserted between the two, the object of which is self-evident.

FIG. 2.



Bearing in mind the demonstration contained in the previous article relating to the diminution of energy of heat rays projected at an acute angle to the radiant surface, it will be perceived, on mere inspection, that the upper zones represented in our diagram, though containing an equal area with the lower zones, cannot possibly transmit the same temperature as the latter. The advocates of the views expressed in "Mécanique Céleste" will be surprised to learn that, notwithstanding the absence of an intervening retarding medium, so great is the difference of energy communicated, that while the zone, D, of the experimental incandescent sphere transmits a temperature of 42·5° to the thermometer, the zone, A, transmits only 4·7°. The latter zone being further from the thermometer than the former, a correction is, however, necessary on account of the increased dispersion of the heat rays before reaching the bulb. This correction being made, the true ratio of temperature transmitted by the zones, D and A, will be 42·50° : 6·19°. Consequently, the heat rays projected from the lower zone of the incandescent sphere towards the bulb of the thermometer transmit nearly seven times higher temperature than the rays from the upper zone. The amount of radiant surface being alike in each zone, while the temperature of the sphere is uniform throughout, it will be admitted that our practical test has clearly demonstrated the feebleness of the rays of heat projected from the border of an incandescent sphere towards a given point. It is hardly necessary to add that each zone has called for a separate experiment, rendering reheating of the sphere indispensable for each. The same expedient has, therefore, been resorted to in order to insure an equal degree of temperature during each experiment, as in the case of the incandescent inclined disk, discussed in the previous article. Of course, it has been found impracticable to impart an equal temperature to the sphere for each oper-

ation; but this difficulty has been satisfactorily overcome by establishing a mean, as in the case referred to. Besides, the result may be checked by computing the degree of temperature capable of being transmitted to the recording thermometer by each zone in accordance with the relation which the intensities bear to the angles formed by the radiating surface and the heat rays projected towards the center of the bulb. Before giving an account of our experiments, let us then demonstrate, theoretically, what temperature each zone ought to communicate to the thermometer, in conformity with the ascertained fact, that the intensity of the radiant heat transmitted by an incandescent disk is directly proportional to the sines of the angles formed by the projected heat rays and the radiating surface. In order to simplify the demonstration, the several zones have been divided into halves, by a dotted line, see Fig. 7; radial lines being drawn to the thermometer at Z, from the points of intersection of the dotted

FIG. 3.

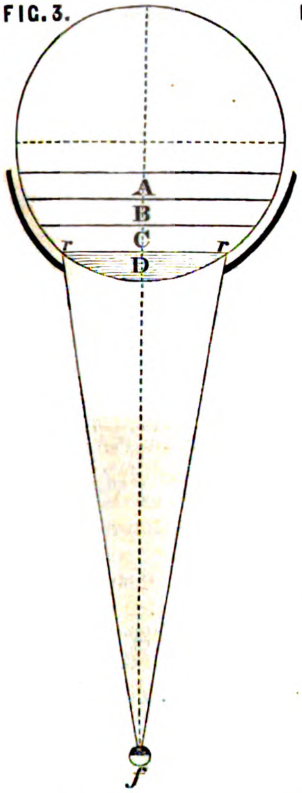


FIG. 4.

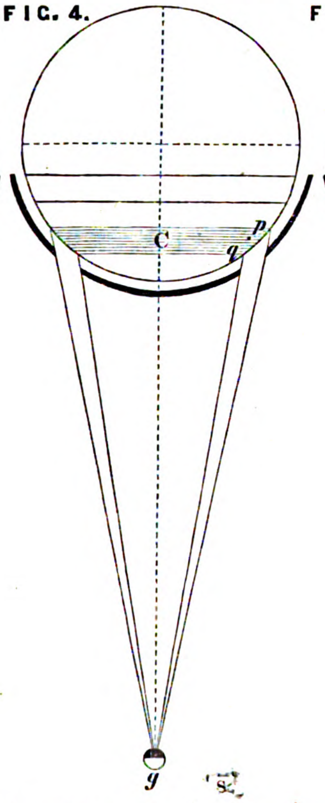


FIG. 5.

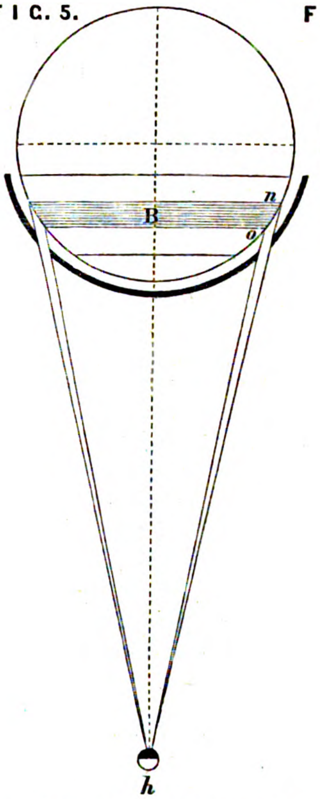


FIG. 6.

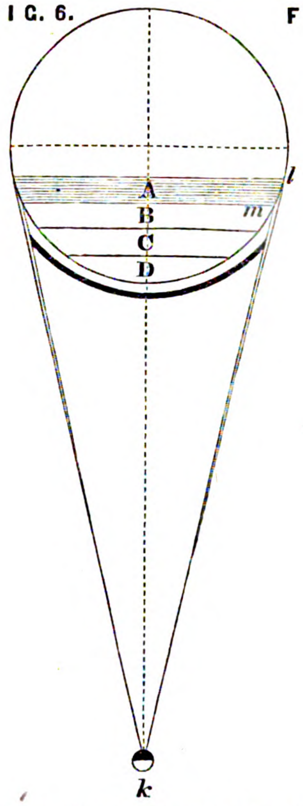
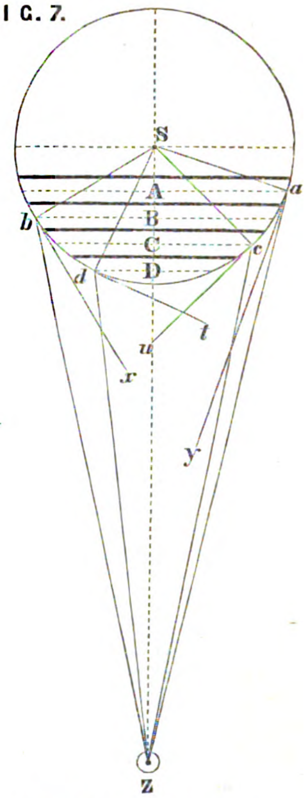


FIG. 7.

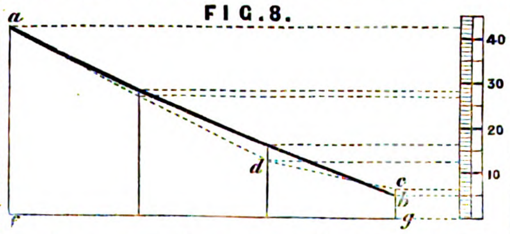


lines and the circumference of the sphere. Tangential lines, dt, cu, bx, and ay, have also been drawn from the points of intersection referred to. It will be evident on considering the properties of spherical zones, that the radial lines, dZ, cZ, bZ, and aZ, represent the mean direction of the heat rays projected by each zone respectively towards Z. Hence the sines of the angles, tdZ, ucZ, xbZ, and yaZ, will determine the amount of radiant heat transmitted towards Z by each of the zones, D, C, B, and A. Calculation shows that, if the sine of the angle, tdZ, be represented by unity, the sines of the other angles, in the order presented, will be 0·671, 0·384, and 0·121, while the experiments which have been made show that the zone, D, transmits a temperature of 42·50° to the recording thermometer. Consequently, the zones, C, B, and A, ought to transmit respectively 28·50°, 16·31°, and 5·16° to the thermometer at Z. The accompanying Table shows to what extent the actual temperatures transmitted by the incandescent sphere differ from the stated computed temperatures. It should be observed that no direct comparison can be based upon the temperatures entered in the fourth column, since the heat rays projected by the several zones are subjected to

1	2		3	4	5	6
Zone.	Mean angle of projection.		Comparative sine.	Observed temperature.	Corrected temperature.	Comput'd temperature.
	DEG.	MIN.		DEG.	DEG.	DEG.
D	58	0	1·000	42·5	42·50	42·50
C	34	40	0·671	24·2	27·49	28·50
B	19	0	0·384	10·1	12·82	16·31
A	5	55	0·121	4·7	6·19	5·16

different degrees of dispersion, owing to the unequal distance from the thermometer. Due allowance being made for the dispersion of the rays, in conformity with the elements furnished in Fig. 7, the consequent augmentation of temperature has been added, and the corrected values entered in the fifth column of the Table. The computed temperatures will be found in the sixth column. It will be supposed at first sight that the figures entered in the Table indicate a serious discrepancy between the observed and the computed temperature. That such is not the case will be found on referring to Fig. 8, in which the ordinates of the

FIG. 8.



regular curve, ab, represent the computed temperatures, while the ordinates of the irregular curve, adc, represent the observed temperatures. Obviously, the computed and the observed energies transmitted by the radiation of the incandescent sphere are truly represented by the superficies contained between the base, fg, and the curves, ab and adc respectively, the ratio being 1·000 : 0·945. Considering the insignificance of this discrepancy, in connection with the difficulty of bringing the heated sphere to an equal degree of incandescence during each experiment, it will be admitted that the instituted test has proved conclusive, and that the inaccuracy of the theory promulgated in "Mécanique Céleste" regarding the radiant energy transmitted by the sun has been fully demonstrated.

NEW YORK, Dec. 29, 1871.

American Silk Manufacture.

On Feb. 28, at Washington, D. C., the Congressional Committee of Ways and Means held a sitting with reference to tariff affairs, and listened to a delegation of silk manufacturers and operatives from New York, New Jersey, Massachusetts, and Connecticut. They exhibited specimens of raw and manufactured silks of all kinds, excepting dress goods, showing the progress of the manufacture in this country, both as to quality and quantity. This industry has grown as follows:—The capital invested has increased from \$3,000,000 to \$25,000,000. It now affords employment for 16,000 operatives, three-fourths of them women and young persons, for whom such employment is specially adapted, it being clean, light, and healthy. The wages paid these operatives amount to \$7,200,000 per annum, being a weekly average for women of \$7, and for males \$12. One-third of these operatives are immigrants from Europe, and have become teachers for our native-born operatives. As compared with the above, the wages paid in the Austrian Tyrol for the same kind of work is from 90 cents to \$1 for sixty-nine hours' work, the operatives having poor shelter and food, for which each pay 45 cents a week. The delegation admit that silk goods are higher than before 1861; but this is mainly owing to the fact that all raw silks in the countries of production are now more than double the price they were immediately before 1861. One of the delegation—an operative—informed the Committee of Ways and Means that he could save as much here, after living better, as he could earn in the old country. The delegation will next be heard before the Finance Committee.

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AND EACH BEARING THAT DATE.

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124,018.—COSMETIC COMPOUND.—Harriet Z. Sill, assignor to herself and Atlee V. Coale, Pittsburg, Pa.
124,019.—DINNER-PAIL.—Henry L. Simonson and Abraham R. Simonson, Graniteville, N. Y.
124,020.—GRAIN-BINDER.—William Siverd, Jun., Geneseo, N. Y.
124,021.—WINDMILL.—Isaac R. Snow, Sterling, Ill.
124,022.—PAVEMENT.—Charles G. Von Tagen, Philadelphia, Pa.
124,023.—CLOTHES-BRUSH.—Alexander J. Walker, Flatbush, N. Y. Ante-dated Feb. 10, 1872.
124,024.—PUMP.—Rivera Ward, Newark, N. J.
124,025.—TUCK-CREASING ATTACHMENT FOR SEWING-MACHINES.—Jefferson G. Wiggins, Lima, N. Y.
124,026.—RUNNING-GEAR FOR CARRIAGES.—Eli Wigle, Bay City, Mich.
124,027.—ANIMAL-TRAP.—Hudson H. C. Arnold, Burlington, Kan.
124,028.—WEATHERBOARD GAUGE.—Seth G. Bigelow, Silver Lake, assignor to himself and J. M. Buridge, North Manchester, Ind.
124,029.—MACHINE FOR SETTING BUTTON OR LACING HOOKS.—Horace C. Bradford, Providence, R. I.
124,030.—APPARATUS FOR EXTRACTING SACCHARINE MATTER FROM SUGAR-CANE.—Marius S. Bringier, Parish of Ascension, La.
124,031.—SAWING MACHINE.—David J. Brougher, New York City.
124,032.—SPRING-BED BOTTOM.—George Brownlee, Princeton, Ind.
124,033.—WATER CUT-OFF.—John W. Burkholder, Rushford, Minn.
124,034.—LATH MACHINE.—James H. Butler, Hampden, Maine.
124,035.—COTTON AND HAY PRESS.—Adam W. Clarkson, Due West, S. C.
124,036.—MECHANICAL MOVEMENT.—Reuben F. Cochran, Barry, Md.
124,037.—AWNING-SLIDE.—Thomas F. Darcy, New York City.
124,038.—WATER-ELEVATOR.—James Daykin, Cleveland, Ohio.
124,039.—STOVE PLATFORM.—Emanuel Detwiller, Milwaukee, Wis.
124,040.—BROOM.—Robert F. Dobson, Darlington, Wis.
124,041.—DEODORIZING AND FERTILIZING MATERIAL.—Julius Edmund Dotch, Washington, D. C. Ante-dated Feb. 14, 1872.
124,042.—BRACED CHAIN.—George H. Edwards, Lanark, Ill.
124,043.—MANUFACTURE OF METALLIC MATCH-SAFES.—James Fallows, Philadelphia, Pa.
124,044.—CLOTH DOUBLING AND FOLDING MACHINE.—John W. Farwell, Lewiston, Maine.
124,045.—CONSTRUCTING SUBMARINE TUNNELS.—John G. Foster, Boston, Mass.
124,046.—BUTTON-HOLE SCISSORS.—Edward A. Franklin, Brenham, Tex.
124,047.—BEATER PRESS.—Franklin Frey, Liberty, Ill.
124,048.—PAPER-CALENDERING ROLL.—John H. Garfield, assignor to himself, Thomas Rice, and Frederick Curtis, Newton Lower Falls, Mass.
124,049.—BOX-OPENER.—Jeremiah C. Gaston, Cincinnati, Ohio.
124,050.—COMBINED BLIND-OPENER AND SLAT-REGULATOR.—Louis Gathmann, Chicago, Ill.
124,051.—FRINGE.—James E. Gillespie, Norwich, Conn. Ante-dated Feb. 10, 1872.
124,052.—QUILTING-FRAME.—Robert J. Gilham, Columbia, Tenn.
124,053.—CUT-OFF FOR WATER-PIPES.—Francis H. Goddard, assignor to himself and W. T. Warner, Omaha, Neb.
124,054.—FLY-FAN.—George A. Goodrich and Peter Miller, Hope, Ohio.
124,055.—CART-SADDLE.—William H. Gordon, Norfolk, Va.
124,056.—BREECH-LOADING FIRE-ARM.—Ruth Goshan, New York City.
124,057.—SHINGLE MACHINE.—Jerome V. Gue and George I. Anderson, North Western, N. Y.
124,058.—MACHINERY CLUTCH.—Westel E. Hawkins, assignor to himself and Edward F. Cook, Wallingford, Conn.
124,059.—COMPOSITION PAVEMENT.—Joshua R. Hayes, Philadelphia, Pa. Ante-dated Feb. 17, 1872.
124,060.—CANAL-BOAT.—Dennis Hinchy, Santiago, Chili.
124,061.—WATER-COURSE ACROSS ROADWAYS.—Abel G. Hodgman, Lowell, Mass.
124,062.—MACHINE FOR ROLLING HARROW-TEETH.—Andrew H. Holmes, Alleghany, Pa.
124,063.—SOLE-CHANNELERS.—Elijah D. Howard, Lynn, assignor to Henry S. Vrooman, Boston, Mass.
124,064.—WOOD PAVEMENT.—Stephen H. Ingersoll, Brooklyn, N. Y.
124,065.—STEAM-CONDENSER.—Archibald Kennedy and John H. Berkshire, Muscatine, Iowa.
124,066.—KEY FOR LOCKS.—Julius Koenig, Erie, Pa.
124,067.—MACHINERY FOR CUTTING AND HEADING NAILS.—Richard C. Lambert, Quincy, Mass.
124,068.—CORN-HUSKING AND SHELLING MACHINE.—Alexander Lane, Moscow, Ky.
124,069.—COMBINED SAD-IRON, FLUTING-IRON, AND NUT-CRACKER.—Albert Leeds and Lodowick Leeds, assignor of one-third their right to Harris T. Fitch, New London, Conn.
124,070.—WHIP-LASH.—Edward B. Light, Westfield, Mass.
124,071.—CLOTHES-PIN.—Andrew B. Lipsey, West Hoboken, N. J.
124,072.—GATE FOR TURNING BRIDGES.—Rudolph Ladewig and August Rosenberg, Berlin, Prussia.
124,073.—CLOTHES-WRINGER.—Joseph S. Maughlin and William C. Marr, Onawa, Iowa.
124,074.—DITCHING MACHINE.—Jordan W. McAllister and John C. Poffenberger, Jacksonville, Ill.
124,075.—LAST.—William J. B. Mills, Philadelphia, Pa., assignor to De Witt C. Taylor, trustee, New York City.
124,076.—CRUCIBLE FOR MELTING METALS, ETC.—John L. North, Ansonia, Conn.
124,077.—PROCESS FOR DESULPHURIZING ORES.—John S. Oliver, New York City.
124,078.—TOY-BLOCKS.—James S. Ostrander, New York City.
124,079.—PUFFING-IRON.—Martha Parry, Rochester, N. Y. Ante-dated Feb. 9, 1872.
124,080.—APPARATUS FOR SEASONING AND PRESERVING WOOD.—William Tilden Pelton, New York City.
124,081.—WOOD PAVEMENT.—Henry E. Perry, San Francisco, Cal.
124,082.—COCK.—Thomas Prosser, Brooklyn (E. D.), N. Y.
124,083.—WASHING MACHINE.—Chauncey P. Remington, Smith's Mills, N. Y.
124,084.—SHOE.—George Alden Richardson, Reading, Mass.
124,085.—DISH-DRAINER.—Henry R. Richmond, New Plymouth, New Zealand.
124,086.—GAUGE FOR SEWING-MACHINES.—Charles C. Roberts, Perrysburg, Ohio.
124,087.—WINDLASS.—William Rogers, assignor of one-half his right to Alexander Charters, Cleveland, Ohio. Ante-dated Feb. 17, 1872.
124,088.—CURTAIN-FIXTURE.—Francis B. Scott, Lancaster, N. Y. Ante-dated Feb. 9, 1872.
124,089.—BIT.—Henry S. Shepardson, Shelburne, Mass.
124,090.—COTTON-BALE TIE.—John L. Sheppard, Charleston, S. C.
124,091.—BORING MACHINE.—John Simpson, Meadville, Pa.
124,092.—OIL-HOLE COVER FOR JOURNALS.—Smith A. Skinner, Hoosick Falls, N. Y.
124,093.—COAL-SCUTTLE.—George Smith, Williamsburg, N. Y.
124,094.—METALLIC COUNTER FOR BOOTS AND SHOES.—Almond R. Spaulding, Clinton, Maine.
124,095.—STEAM-PUMP.—Samuel Stanton, New York City.
124,096.—BROADCAST-SOWER.—Charles L. Story, assignor to Mark Stull, William T. Oldham, and James M. Loving, Calhoun, Ky.
124,097.—GAS-STOVE.—William Henry Tayler, Surry, England.
124,098.—MACHINE FOR SKIVING BOOT AND SHOE COUNTERS.—Henry S. Vrooman, Boston, Mass.
124,099.—INSECT-TRAP.—John H. Welch and John Baker, Fort Wayne, Ind.
124,100.—TUYERE.—William Werts, Camden, N. J. Ante-dated Feb. 26, 1872.
124,101.—SHINGLE MACHINE.—Alexander White, Fond du Lac, Wis.
124,102.—FASTENER FOR MEETING-RAILS OF SASHES.—John B. Whitney, New York City.
124,103.—AUTOMATIC FAN.—John B. Williamson, Louisville, Ky.
124,104.—ELECTRIC CLOCK.—Elisha Wilson, Elizabeth, N. J.
124,105.—IRON FENCE.—Oscar Wilson, Middleburg, N. Y.
124,106.—CASTER FOR SEWING-MACHINES.—Wallace W. Wright, Lynn, Mass.
124,107.—MACHINE FOR MAKING STAPLES.—John Adt, New Haven, Conn.
124,108.—RIGGING-SCREW.—John R. Anderson, New York City.
124,109.—BED-BOTTOM.—Charles D. Austin, Amsterdam, N. Y.
124,110.—HORSE HAY-RAKE.—Levi B. Ball, Dayton, Ohio.
124,111.—HINGE.—James Barrows, Hyde Park, Mass.
124,112.—TREATING REFUSE ANIMAL MATTER FOR THE MANUFACTURE OF FERTILIZERS, ETC.—William L. Bradley, Boston, Mass.
124,113.—SPRING-SEAT FOR HARVESTERS.—Thomas Brett, Geneva, Ohio.
124,114.—IMPLEMENT FOR CUTTING SHEET MATERIALS.—John F. Bright, assignor to himself and George W. Bauer, Washington, D. C.
124,115.—Not issued.
124,116.—ROLL FOR UTILIZING THE FAG-ENDS OF RAILROAD RAILS.—Henry Chisholm, Cleveland, Ohio.
124,117.—ROOFING COMPOSITION.—David G. Conger, Chicago, Ill.
124,118.—RAILWAY-SWITCH.—Alonzo W. Cram, St. Louis, Mo.
124,119.—MACHINE FOR BURRING WOOL.—Daniel Crowley, assignor to himself and Isaac A. Stringfellow, Philadelphia, Pa.
124,120.—TOWEL-RACK.—Harrison W. Curtis, assignor to Hale, Goodman & Co., Philadelphia, Pa.
124,121.—HOLDER FOR HARVESTER-CUTTERS WHILE BEING SHARPENED.—William Henry Daniels, Bryan, Ohio.
124,122.—STONE-GATHERER.—Omar Davis, Battle Creek, Mich.
124,123.—MACHINE FOR BENDING METAL.—William C. Eiseman, Pittsburg, Pa.
124,124.—Not issued.
124,125.—LOCK.—Josiah B. Frost, Jackson, Mich., assignor to himself and Horace J. Frost, Washington, D. C.
124,126.—SWITCH FOR TURNING ON AND OFF AND LIGHTING GAS BY ELECTRICITY.—Samuel Gardiner, Jun., Washington, D. C.
124,127.—SOLE AND HEEL FOR BOOTS AND SHOES.—John Gibson, Jun., Albany, N. Y.
124,128.—Not issued.
124,129.—BOX-OPENER.—William Gould, Minneapolis, Minn.
124,130.—HARVESTER-RAKE.—George S. Grier, Milford, Del.
124,131.—CURTAIN-FIXTURE.—Thomas Hagerty, Richmond, Va. Ante-dated Feb. 14, 1872.
124,132.—FIRE-PLACE FENDER.—William N. Hall, Springfield, Tex.
124,133.—PACKING FOR JOURNAL-BOXES.—Edmund S. Hanna, Pittsburg, Pa.
124,134.—COWL FOR EMERY-WHEELS.—Charles Heaton, New York City, assignor to the "Tanite Company," Stroudsburg, Pa.
124,135.—LAYING CONCRETE PAVEMENTS.—Julius Hopke and John W. Heesch, Hoboken, N. J.
124,136.—CANAL-BOAT.—John Hughes, New Berne, N. C.
124,137.—CLOTHES-PIN MACHINE.—Stephen Inman, Rockford, assignor to William H. Ovington, Chicago, Ill.
124,138.—LATH-AND-PLASTER WALLS AND CEILINGS.—Otto Jevne, Chicago, Ill.
124,139.—IMITATION BUTTON.—Samuel G. Jones, North Bridgewater, Mass.
124,140.—HAND-CULTIVATOR.—William G. Jones, Marshall, Tex.
124,141.—MANUFACTURE OF BRUSHES.—Alfred H. Kidney and Richard J. Simpson, New York City.
124,142.—CIRCULAR SAW-MILL.—Philander P. Lane, assignor to Lane & Bodley, Cincinnati, Ohio.
124,143.—PLOW.—Jesse B. Latimer, Stewart County, Ga.
124,144.—HOLDBACK.—George B. Lumpkin, Lexington, Ga.

124,145.—Self-sealing Pails.—Charles A. Marshall, Cleveland, Ohio.
124,146.—Window-shade.—Francis C. Martin, Brooklyn, N. Y.
124,147.—Swift and Reel.—Leonard F. Molthorp, Rome, Wis.
124,148.—Apparatus for laying Concrete Pavements.—George H. Moore, Norwich, Conn.
124,149.—Animal-trap.—Josiah Newell, Ypsilanti, Mich.
124,150.—Machine for breaking Stone.—John Robert Ord and Henry Maddison, Darlington, Great Britain.
124,151.—Vapor-burner.—Robert W. Park, Philadelphia, Pa.
124,152.—Ink-stand.—John Peard, New York City.
124,153.—Curtain Fixture.—Henry H. Phillips, Buffalo, N. Y.
124,154.—Curtain Fixture.—Henry H. Phillips, Buffalo, N. Y.
124,155.—Paper-trimming Machine.—David Pirie and Alexander Croom, Dundee, North Britain.
124,156.—Fruit-can.—William Polyblank and George Polyblank, Cleveland, Ohio.
124,157.—Boot-crimper.—Elcanah Powell, New London, Ind.
124,158.—Butter-safe.—Taylor Pyle, Oxford, Pa.
124,159.—Thill-coupling.—Barnet R. Rapp, assignor to himself and William H. Lawson, West Chester, Pa.
124,160.—Anti-rattling Journal for the Balance-wheels of Sewing-machines.—Philip L. Reese, Mount Sterling, Ohio.
124,161.—Process and Apparatus for preserving Animal Matters.—Adolphe Rock, New Orleans, La.
124,162.—Oscillating Engine.—Albert Schmid, Zurich, Switzerland.
124,163.—Pedal attachment for Musical Instruments.—Sigmund Schoenbrun, New York City.
124,164—Neck-tie Holder.—John O. Schoener, St. Louis, Mo.
124,165.—Apparatus for applying Chalk to Locomotive-wheels.—Nathaniel Sehner, assignor to himself, Jonathan H. Seymour, and Alfred R. Appleman, Hagerstown, Md.
124,166.—Harvester-dropper.—Byron Seneff, Chillicothe, Ohio.
124,167.—Sewing-machine.—Alvin Shattuck, Buffalo, N. Y.
124,168.—Washing Machine.—Robert H. Sipes, Bloody Run, Ohio.
124,169.—Window-sash Frame.—Charles A. Smith, assignor to himself and Jacob E. Ridgway, Philadelphia, Pa.
124,170.—Means of attaching Propellers to Vessels.—George Smith, Philadelphia, Pa.
124,171.—Fruit-can.—Charles F. Spencer, Cleveland, Ohio.
124,172.—Apparatus for turning the Leaves of Music Books, etc.—Robert J. Stuart, Yonkers, N. Y.
124,173.—Razor-strop and Polishing-wheel.—J. Milton Taylor, Laurel Point, West Va.
124,174.—Railway-rail.—Theodore R. Timby, Tarrytown, N. Y.
124,175.—Railway-rail.—Theodore R. Timby, Tarrytown, N. Y.
124,176.—Churn.—Watson Twining, assignor to Clement & Dunbar, Philadelphia, Pa.
124,177.—Machine for pressing Garments.—William B. Walker, Boston, Mass.
124,178.—Awning-windlass.—Julius Walter, Cincinnati, Ohio.
124,179.—Machine for cutting Textile Fabrics.—Albin Warth, Stapleton, N. Y.
124,180.—Machine for cutting Textile Fabrics.—Albin Warth, Stapleton, N. Y.
124,181.—Signal-light.—Hartshorn White, Phillipsburg, N. J.
124,182.—Piston-rod Packing.—Henry C. White, New York City, assignor to Thomas Joyce, Brooklyn, N. Y.
124,183.—Packing for Engines, etc.—Henry C. White, New York City, assignor of one-half his right to Thomas Joyce, Brooklyn, N. Y.
124,184.—Horse-collar.—John Whitney, Franklinville, N. Y. Ante-dated Feb. 10, 1872.
124,185.—Harness-pad.—Philip H. Wiedersum, assignor to Wiedersum Manufacturing Company, New York City.
124,186.—Wheel for Traction Engines.—Douw D. Williamson, New York City.
124,187.—Cheek-piece for Bridle-bits.—William P. Wolfington, assignor to J. J. Harbison and J. B. Gathright, Louisville, Ky.
124,188.—Treating Grain for Distilling and Brewing.—Adolph Woolner, Louisville, Ky.
124,189.—Padlock.—Daniel Zeiler, assignor to himself and Frank L. Fluck, Sumneytown, Pa.
124,190.—Composition-metal Brake-shoe for Railroad-cars.—William McConway, Pittsburg, Pa.
124,191.—Woven Felted Fabrics for Bonnets, etc.—Richard S. Gillespie and Fredrack Ziesing, New York City.

RE-ISSUES.

4,767.—Car-spring.—Erastus T. Bussell, assignor to the Union Car-spring Company, Indianapolis, Ind. Patent No. 84,258, dated Nov. 24, 1868.
4,768.—Stud-fastening for Furniture and for other Purposes.—Thomas J. Close, Philadelphia, Pa. Patent No. 86,644, dated Feb. 9, 1869; re-issue No. 3,686, dated Oct. 26, 1869.
4,769.—Centrifugal Machine for draining Sugar and other Substances.—Samuel S. Hepworth, assignor, by mesne-assignments, of part interest to Gouverneur Paulding, Yonkers, N. Y. Patent No. 82,314, dated Sept. 22, 1868.
4,770.—Treating Oil-wells to remove Obstructions to the Flow of Oil.—Butler G. Noble, Brooklyn, N. Y. Patent No. 105,590, dated July 19, 1870.
4,771.—Apparatus for treating Paper-stock.—George Sinclair, Leith, Scotland. Patent No. 110,873, dated Jan. 10, 1871.
4,772.—Method of applying Cast-steel to Articles made of Iron.—William H. Singer, Alleghany City, Pa. Patent No. 85,140, dated Dec. 22, 1868.
4,773.—Hot-air Register.—William Young, Easton, Pa., assignor to the Tuttle & Bailey Manufacturing Company, New York City. Patent No. 114,247, dated April 25, 1871.

DESIGNS.

5,557 and 5,558.—Cooking-stove.—Charles H. Buck and Wiley S. Wright, St. Louis, Mo.
5,559.—Side Frame for Chairs.—Joseph H. Travis, Charlestown, and Eugene H. Mahoney, Boston, Mass.
5,560.—Fireman's Hat.—Charles D. P. Watters, New York City.
5,561 and 5,562.—Center Piece for Ceilings.—Joseph Woolman Reeves, assignor to William H. French, Philadelphia, Pa.

TRADE-MARKS.

667.—Soap.—J. P. Babcock & Co., Stonington, Conn.
668.—Tallow Packing for Car-journals.—Isaac U. Coles & Co., New York City.
669 and 670.—Soap.—Curtis Davis, Cambridgeport, Mass.
671.—Liquor Package.—Rogers George, New York City.
672.—Water-proof Material.—Alfred A. Hawley, Methuen, Mass.
673.—Neck-tie, Bow, etc.—Hurlbut & Shantz, Philadelphia, Pa.
674 to 676.—Spice.—Stickney & Poor, Boston, Mass.
677.—Coffee.—Stickney & Poor, Boston, Mass.
678.—Soda-water Apparatus.—James W. Tufts, Medford, Mass.
679.—Sewing-machine.—Wilson Sewing-Machine Company, Cleveland, Ohio.
680.—Shoe-blacking.—Charles H. Young & Co., Boston, Mass.

EXTENSIONS.

19,490.—Metallic Tie for Cotton-bales.—Frederick Cook, March 2, 1858.
19,412.—Cultivator.—Paul Dennis, Feb. 23, 1858; re-issued Aug. 4, 1863, No. 1,515.
19,420.—Horse-rake.—William Horning, Feb. 23, 1858.
19,465.—Carpet-beating Machine.—Joseph Harris, Jun., and Daniel Holmes, Feb. 23, 1858; re-issued to Daniel Holmes, assignee, May 13, 1862, No. 1,307.
19,417.—Cott-ongin.—Benjamin David Gullett, Feb. 23, 1858.

APPLICATION FOR EXTENSION.

Opponents of extensions must file *written* objections in the Patent Office at least 20 days before the day-of-hearing; and on that day, at noon, they must appear personally, or by proxy, at the Patent Office, and state the reasons of their opposition. All testimony—*pro* or *con*—must be taken and transmitted in accordance with the official rules, which will be furnished on application. The under-named patentees have recently petitioned for extension (for seven years) of patent granted to them in the year 1858:—

William H. Seymour and Henry Pease, Brockport, N. Y.—*Harvester*.—Patented May 25, 1858; testimony will close on April 23, next; last day for filing arguments and examiner's report, May 3; day-of-hearing, May 8.

METAL MARKET.

[*Corrected weekly for the "American Artisan."*]

New York City, Saturday, Mar. 6, 1872.

IRON.

Pig, Scotch, No. 1 (cash), per tun	$33 00	@	35 00
do. American, No. 1 (cash)	35 00	@	36 00
do. do. No. 2	33 00	@	34 00
Swedish, ordinary sizes	105 00	@	120 00
Common	72 50	@	77 50
Refined	77 50	@	85 00
Rods	82 50	@	120 00
Horse-shoe	95 00	@	— —
Hoop	100 00	@	145 00
Scroll	100 00	@	125 00
Nail-rods, per lb	— 6¾	@	— —
Spring	— 7⅜	@	— —
Tire	— 7½	@	8 —

STEEL.

Bars, best cast, warranted, per lb	— 18	@	— 19½
Sheet, do	— 16	@	— —
do. second quality	— 15½	@	— —
do. third quality	— 12	@	— —
Saw-plates, circular	— 20	@	— 30
Double-shear, warranted	— 18	@	— —
Single do	— —	@	— —
Montague & Co. (cast bars)	— 15½	@	— —
Machinery, round	— 11	@	— 13
German, best	— 11	@	— —
do. goat	— 10	@	— —
do. eagle	— 9	@	— —
Blister, warranted	— 14	@	— —
do. common	— 10	@	— —
Jessop & Sons', common	— 17	@	— —
Double-refined	— 26½	@	— —
Stone-ax shapes	— 26½	@	— —

ZINC.

Mussulman and American, per lb	6½	@	— 9
Solder, per lb	— 22	@	— 23
Antimony	— 16	@	— 17
Spelter	— 7	@	— 7½
Copper, old	— 17	@	——
Brass, do	— 14	@	— —
Nails, roofing, per keg	7 50	@	— —
do. do. tinned	12 50	@	— —

LEAD.

American, per 100 lbs	7 50	@	8 00
German	7 50	@	8 00
Bar	8 50	@	9 00
Pipe and Sheet	8 50	@	9 00

Letter Box

G. L. C., of Ind.—India-rubber varnish for balloons is made by dissolving the india-rubber, cut fine, in five times its weight of rectified oil of turpentine, allowing the mixture to stand for some days in a warm place. Subsequently boil the solution with eight times its weight of boiled linseed oil. Apply warm.

M. R., of N. Y.—The tie-rods on switch rails should be bolted firmly to the base or flange of the rail. The too common plan of having them clasp the rail loosely, driven on from the end of the rail, is a careless and unprofitable mode.

W. L., of Ohio.—In the construction and application of the slide-valve, there must be taken into consideration the speed of the piston, the degree of steam-pressure, rate of expansion used, length of connecting-rod, lead of valve on piston, etc., and a moment's thought will convince you that our treatment of the subject "both in general and in all its specialties" would far transcend in length the limits of a newspaper article. You can get all the information you specify from standard works on the subject. If you carry out your proposed experiments, we shall be pleased to learn the results, and if they shall seem of interest, we will cheerfully publish them.

G. F. S., of Pa.—1. We have no further knowledge of the manufacture in this country of combined steel and rubber belting than is comprised in the article you refer to. 2. Legislation to prevent the running of road steamers would have to be a matter for each State to determine for itself, as the General Government would have no jurisdiction in such a case. Cities, however, can make ordinances regulating travel within corporation limits. We do not know that any State in the Union has placed such a drawback in the way of the introduction of traction engines.

L. S., of Md.—It is well known that Mississippi water contains forty grains of mud to the gallon, and the Nile, Ganges, and some other rivers are equally charged with impurities. Perhaps the purest river water in the world is that of the Loka, in Sweden, which flows over solid rock, and has but one-twentieth of a grain of impurities to the gallon.

E. N., of Ky.—You are correct in your estimate of the method suggested of cooking food at a high heat. It was long ago found that soup made by dissolving bones and coarse portions of flesh, by the aid of high-pressure steam, was innutritious, and recent experiments made with various kinds of meat show that, if the heat is raised above 214° Fahr., the food is not so good.

J. T., of N. Y.—The publication of an invention does not prevent an inventor from afterwards obtaining a patent for it.

ENGLISH PATENT JOURNAL.

LIST OF APPLICATIONS FOR PATENTS

ON WHICH

Provisional Protections

HAVE BEEN OBTAINED IN ENGLAND BY OR FOR AMERICAN INVENTORS.

[*This list is condensed weekly from the "Journal of the British Commissioners of Patents," expressly for the* "American Artisan."]

252.—Seal Lock.—American Seal Lock Company, New York City.—Jan. 25, 1872.

253.—Diaphragm motor, etc.—W. E. Prall, Washington, D. C.—Jan. 25, 1872.

266.—Brick kiln.—A. R. Morgan, New York City.—Jan. 27, 1872.

268.—Improvement in ordnance.—D. O. Macomber, Utica, N. Y.—Jan. 27, 1872.

276.—Improved alarm for flour, etc., mills.—T. Glasspool, Minneapolis, Minn.—Jan. 29, 1872.

315.—Shuttle-operating mechanism.—E. P. Terrell, D. B. Allen, and J. Enoch, West Liberty, Ohio.—Feb. 1, 1872.

329.—Method of preparing, etc., hops.—D. A. Clarke, Baltimore, Md.—Feb. 1, 1872.

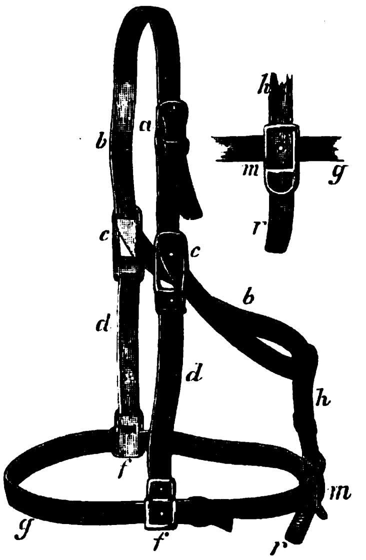
375.—Apparatus for lighting gas.—A. N. Allen and R. H. Dewey, Pittsfield, Mass.—Feb. 5, 1872.

387.—Gunpowder engine.—J. S. Foster, Salem, Mass.—Feb. 6, 1872.

THE "COMMON SENSE" HALTER.

THE accompanying engravings illustrate an improved leather halter for horses, etc., termed by the manufacturers the "common sense," and designed with especial reference to simplicity of construction and economy in cost. The larger figure shows the halter complete, while the smaller one to the right is a side view of the means employed for connecting a part of the device in place. The improvement was patented Dec. 12, 1871, and State, county, and shop rights are for sale by Carpenter & Hazard, Wilmington, Ohio.

The halter has the same general form as the ordinary "five-ring" halter, but aside from the attachment of the buckle, *a*, on the crown-and-throat piece, *b*, no stitching is required, and consequently no laps, as in the usual mode of attaching buckles. The crown-and-throat piece passes obliquely through the peculiarly-shaped buckles, *c*, to the lower end of which buckle the cheek-pieces, *d*, these latter in their turn buckling at *f* to the nose-piece, *g*, the two ends of which con-



nect by one of the buckles serving for the attachment of the cheek-pieces to the nose-piece. The bolt-piece, *h*, attaches to strap, *b*, by a loop, and thence through the buckle or device, *m*, on the back of the nose-piece, terminates in the hitching strap or stale, *r*. It will be noticed that the several straps are readily adjustable, so that the halter can be brought to any size desired. The length of the straps, of ordinary width, are as follows:—Crown-and-throat piece, 3 feet 6 inches; nose-piece, 2 feet 6 inches; cheek-pieces, each 10 inches; the bolt-piece and stale of usual length. The metallic buckles or mountings of this halter cost, it is stated, about the same as those of the five-ring halter, but by the improved construction just previously described five feet in length of leather is saved in the straps, and six feet of stitching in the attachment of the parts to each other.

Paper and Paper Ash.

M. E. CHEVREUL recently submitted to the Academy of Sciences, Paris, specimens of paper ash from the ruins of the Ministry of Finance. He remarked that these ashes had a much nearer resemblance to a mineral body than to anything of a vegetable origin. These characteristics arise from the very large quantity of mineral constituents in paper as at present manufactured. Paper as formerly made, *i.e*, by hand and in frames, was dipped in a solution containing six to eight per cent. of size and two to three per cent. of alum. When the paper was uniformly wetted with this solution, it was laid upon stretched cords, so that it might be evenly and uniformly dried. The aluminated gelatine in this manner was equally diffused over both surfaces in a thin smooth pellicle, and the paper became impermeable to liquids. In the processes now in use, a boiling solution of starch and resinate of soda is added to the pulp whilst it is rapidly agitated, and when the mixture is complete a quantity of alum is added sufficient to decompose the resinate of soda. Insoluble resinate of alumina is thus produced, which, together with the starch and pulp, constitutes the body of the homogeneous papers now in use. The great difference between this paper and hand-wove consists in the matter which thus replaces the gelatine of the latter; and which is partly inorganic, partly a resinous organic matter insoluble in water, and partly starchy matter, the only ingredient at all resembling gelatine in its behavior with water. Machine paper being homogeneous, and the sizing being diffused through its whole thickness, it follows that, although the upper surface of the paper be entirely removed by erasure, it will still be fit to receive writing ink; whilst in the case of gelatinized paper, the sizing is confined to the surface. Resinate of alumina, however, differs so entirely from the woody fiber which constitutes paper pulp, both in nature and structure, that it requires for its perfect mixture with it so fine a division of the fiber that the strength and substance of the paper thus treated materially suffer, and this accounts for the want of flexibility such papers show as compared with the hand-wove papers, where much greater length of fiber is preserved. When it is also stated that it is the practice to add to the pulp at the time of sizing sulphate of lime, sulphate of baryta, or kaoline, the inferiority of the paper is still more marked. The character of the ash submitted to the Academy is therefore readily understood. Finally, it is the difference of sizing which explains how it is possible to write upon gelatinized paper with indelible ink made from Indian ink, made up with hydrochloric acid to one degree of the areometer; while with resinate of alumina paper, the Indian ink must be mixed with a solution of soda of one degree—the acidulated ink failing to penetrate the pores of the latter paper, and this penetration being the condition required for indelibility.

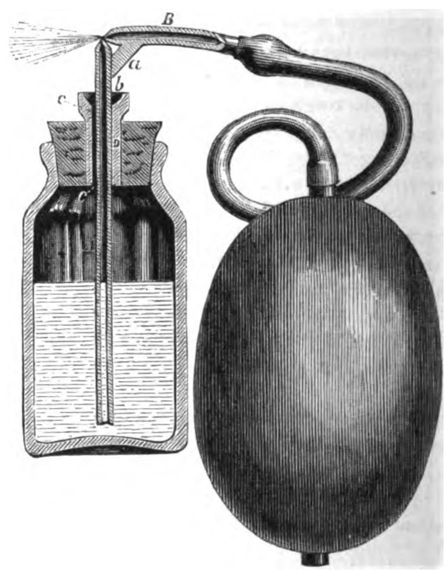
Pig-boats vs. Iron-clads.

ADMIRERS of the old wooden line-of-battle ship, with its hearts of oak, and the thousand memories that song and romance have helped to endear, will pluck up spirit again from a rather provoking accident that has happened to one of the best of the British iron clads. The *Hotspur*, commanded by Lord John Hay, was run into by what the *Army and Navy Gazette* describes as an "old Dublin pig-boat," and besides having her ports and boats carried away "was mauled so severely" as to be obliged to put into harbor for repairs. The old pig-boat, on the other hand, appears to have sustained no injury at all, and went on her way without any difficulty. It will be remembered that at the battle of Lissa the most formidable iron-clad in the Italian Navy was run down and sunk by Admiral Tegethoff in a wooden vessel. The same thing, if we mistake not, occurred in our own war. It would seem, therefore, that iron-clads are not yet invincible even to unarmored antagonists.—*Exchange.*

ESSEX'S PATENT ATOMIZER.

MOST of our readers are doubtless familiar with the device commonly termed an "atomizer," used for distributing liquids in fine spray, and found excellent for bathing the face and forehead when heated from headache or other causes; also for dispersing perfumes upon handkerchiefs, etc. All of these operate in common on the principle of a jet of aeriform fluid blown forcibly past the orifice of a suction or liquid conducting tube, the current of the former drawing up the liquid through and from its tube, and distributing it in the form of minute particles or mist. The improved atomizer herewith illustrated is so constructed as to be readily attached to any bottle or liquid receptacle, the cork or stopper of which is merely perforated to receive it, so that the need of providing a special cork or stopper is done away with, and suitable vent and drip-return passages are formed in the device itself, and of a much more efficient character than are ordinarily furnished.

The bottle is fitted with a suitable cork, vertically perforated for the reception of the suction-tube, A, and its surrounding sleeve, D, across the contracted orifice, at the upper end of which is thrown the air-jet from the air-tube, B, this latter



connected in the usual manner with the hollow elastic bulb whereby the air-jets are produced. The two tubes, A, B, are fixed together in suitable relation with each other, as indicated at *a*. The sleeve, D, is fitted around that part of the air-tube immediately within the cork, and has a flaring drip-cup, *d*, at its upper end to catch whatever moisture may gather or condense from the spray as it issues from the device. Provided internally within the sleeve is a groove, *c*, which forms a channel through which the drip from the cup can pass back into the bottle, and through which, to the latter, air can pass to supply the space vacated by the liquid ejected in the use of the atomizer. It will be seen, therefore, that the more characteristic or essential features of the device are so constructed and connected that they may be readily and conveniently attached both to the bottle and to the bulb, without special skill in manipulation, and that a very satisfactory operation of the apparatus is, at the same time, secured. The whole, when put together, is of course used in the ordinary manner.

This improvement was patented, through the "American Artisan Patent Agency," June 27, 1871, by Mr. James J. Essex, of Newport, R. I.

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ISSUED WEEKLY AT

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WEDNESDAY, MARCH 6, 1872.

AGRICULTURAL ENGINEERING.

ABROAD, the title of agricultural engineer is recognized as one legitimately employed to designate practitioners in the application of technical art to farming. In this country, where, aside from the use of steam in tillage, we have certainly not been behind our foreign friends in the improvement of agriculture by mechanical aids, the term is scarcely known, and has, indeed, no definite meaning. This ought not to be the case, for the time has already come when the close connection of engineering, in the highest sense of the word, with American agriculture must be acknowledged as one of the most notable things in the industrial development of the country. A new, with us, department of engineering, eclectic and comprehensive in character, must therefore at no distant day be formed, and it would be well if many of those who complain that the profession is too full would turn their attention to this as yet uncultured field of effort.

But the profession of agricultural engineering under the conditions imposed in this country will not be light, nor will eminent success be attained except by a rare combination of logical and thorough-going engineering experience, and that originality of conception and audacity of execution that is far more likely to be found in the inventor than in the practicing engineer. For the results demanded by the times can only be secured by the most careful adaptation of means to ends, while the data derived from practice in other countries cannot, owing to innumerable diversities in conditions, be implicitly followed here.

The agricultural engineer will be called upon for a wider, though not by any means a deeper, range than almost any of the other subdivisions into which, in recent years, the profession has been split; for instance, hydraulic and gas engineering. He must be much of a steam engineer, for upon the adaptation of this motive power to farm operations by far the greater portion of our future improvements in husbandry depend. He must be well posted in hydraulics, for irrigation in many regions, embracing millions of acres, is a necessity. He must be well up in architecture, not only because the structure of buildings is a most important item in the economy of the farm, but because taste and convenience must find wider recognition in the agricultural life of our people than they have hitherto done. He must be something of a civil engineer, for, on large plantations and estates, tramways and improved roads must sooner or later find a place of usefulness. He must be a good mechanical engineer, for without this he can neither understand, construct, nor repair the multifold examples of mechanism, ranging from a reaper to a sugar mill, which constitute the most essential appliances of modern tillage. He, too, must have a knowledge of chemistry, for all the adjuncts of farming are vain if the soil is not kept strong by judicious fertilizing, and cattle grow thin, and fences and buildings rot and tumble down, if not cared for in accordance with natural laws, that can only be understandingly observed by a knowledge of scientific truths. Add to this that the agricultural engineer will be called upon to solve many difficulties in the application of new machinery—that for harvesting cotton, for instance—and it will be seen that his profession will not be one inviting to idleness, nor one in which true merit and stern industry will be likely to go unrewarded.

RAILWAY BRIDGE DISASTER.

ON Feb. 23, on the Louisville and Cincinnati short-line railroad, a train running at moderate speed and carrying seventy passengers broke through a bridge, and, falling twenty-five feet, was converted into a heap of splintered wood and mangled human beings. The bridge was a wooden one, and the train fell through it because it was not strong enough. The engineer seems to have kept his presence of mind, and to have had a water-pail handy, so that the proximity of a creek enabled him to extinguish the flames that almost immediately sprang up from the wreck. Only two persons were killed, but fifty-three others were injured. Such, briefly sketched, was a casualty that was but a repetition of many that have hitherto occurred, and the type of many that will hereafter happen. For bridges of wood, no matter how strong originally, weaken continually by decay from the first, until they are condemned by proper examination or have their existence ended as by the disaster just chronicled. As to the prevention of fire in cars broken to fragments, we have often spoken of it at length before, and shall again, but not in this present connection.

It is impossible to ascertain the extent of the wooden bridge and trestle-work on the fifty-odd thousand miles of American railways, but it is sufficiently enormous to call for a much more thorough application of scientific principles in its preservation and care than seems at present to obtain. No doubt an examinaticn of the timbers simply with reference to external appearance would frequently enable possible accident to be forestalled by repair. But wood may be sound as a nut outside and moist with rot or pulverulent with powder-post within. Yet a bit one-eighth of an inch in diameter will bring out borings from the core of a twelve-inch stick without materially affecting its strength, and a microscope in skilled hands will detect at once any lack of integrity in the fibers. Other means might be suggested, but this is enough for our purpose of indicating how a little more knowledge properly applied would enable a little less money to be used for car and locomotive repair, to say nothing of a great deal less of the loss in life and limb to which the traveling public are manifestly subject continually.

HOUSE-TOP GARDENS.

IT has been suggested—perhaps many times—that, in cities where ground is far too valuable to be devoted to the growth even of those flowers most highly prized, the roofs of buildings might be covered with soil, and thereby adorned with a wealth of floral luxuriance. There is nothing impracticable in the idea, and we have heard of one or two instances occurring many years ago in which it was put in practice. An ordinary flat or slightly sloping roof, with a water-tight rim a foot high provided to it, would certainly afford a good support for garden mold, and the watering of the plants could be very easily and effectually provided by a hose and pump. To secure the most satisfactory results, it is more than likely that the house-top garden should be enclosed with glass. Exposed to winds as it would be, the structure would have to be very firmly built, and iron would, aside from the glazing, have mainly to be employed.

Of course, gardens kept in this way would be costly, but so is everything else in great cities, and properly managed they would yield a far greater return than do most luxuries for the outlay expended upon them. Given the glass structure and the twelve inches depth of fertilized loam, no better opportunity need be asked for the growth of indigenous or exotic vegetation. The degree of moisture in the soil would manifestly be under easy control; the temperature could be maintained at any given point by a judicious use of the heat in the products of combustion now allowed to pass out of the chimney without giving up their waste caloric, and, if artificial lights were used, the tillage of the plants could be made a matter of evening amusement as pleasant as it would be unique.

But in the development of any such rare system of floriculture, there would needs be adopted many minor appliances, some of them hitherto proposed for greenhouses, but none in actual use where profit alone is sought, or where the gardener gives his attention at all times to his charge. Of such would be automatic devices for regulating the temperature, the inflow of fresh air, and the supply of moisture. There would also be afforded opportunities much greater than now exist for the testing of matters relating to science by that, by no means inconsiderable, class of business and professional men who lighten the duties of busy lives by amateur research into the mysteries of nature's laws. What, for example, would be of greater popular interest and scientific value than an elaborate series of experiments to determine the action, on different kinds of vegetation, of various kinds of artificial light? It is not to be supposed that anything of this kind will be extensively attempted at any unremote period, but that some day the unused house-tops of our great cities will have another purpose than merely to shed water from the rooms below we consider as greatly probable.

PARLOR FOUNTAINS.

THERE is perhaps no more pleasing sight than that of water falling in spray, and flinging back in glittering splendor the reflection of an intense light. In these days, when novel parlor ornaments are so much thought of, it would perhaps be a good thing if some inventor would contrive a miniature fountain, in which a multitude of mimic jets would flash in the rays of a gas-burner, so as to reproduce on a minor scale the coruscations of an ordinary fountain throwing its water into the sunlight. Such an apparatus would require a forcing apparatus combined with clockwork driven by a strong coiled spring; also, a burner capable of giving an unusually strong light, which, by suitably arranged reflectors, should be concentered on the spray. Possibly a more varied and consequently more pleasing display would be obtained if the light were intermittently flashed

upon the moving liquid. This is hint enough to to those who may wish to take up the subject as a matter of profitable inventive effort. But we may mention furthermore the feasibility of uniting with such a device the use of perfumed water, if such were preferred, and also the making of the fountain adjunctive to an aquarium, where that somewhat troublesome ornament meets with favor.

Pennsylvania Tanneries.

AN immense hemlock bark region in Northwestern Pennsylvania was opened up seven years ago, when the Philadelphia and Erie Railroad commenced running through from Williamsport to Erie in that State, and during the past two or three years ten tanneries, some of which are among the largest in the world, have been built in the section referred to.

The bark lands here, covering more than one hundred miles in length by an almost corresponding breadth, are of seemingly sufficient magnitude to answer for tanning purposes for many generations, but the large establishments erected bid fair to clear it away with a rapidity such as was witnessed by tanners of the last generation in the then great tanning districts of Greene, Sullivan, and Ulster Counties in the State of New York.

The purchases of land in this section have mostly been made by New York parties, at from four to eight dollars an acre. The yield of hemlock bark is an average of ten cords to the acre, and, as a tanner expressed it, they call a cord a cord up there, with bark in a solid pile.

On the line of the railway mentioned are eleven tanneries, with an aggregate of seven hundred and eight thousand sides of leather tanned yearly. The largest tannery in this section, or probably the largest in the world, is at Wilcox, Pa., and is run under the style of the "Wilcox Tanning Company." Operations were commenced here in 1867, a purchase being made of 9,000 acres of land and the right of bark on 23,000 acres more. After the buildings were finished and improvements made, their cost was found to be $240,000, and the land is valued at $180,000 more, making a sum total of $420,000 invested in the enterprise. In connection with it is a lumber mill, where the hemlock lumber is sawed and prepared for market. There were 18,000,000 feet got out last year. Most of this goes East, and sells for an average of $10 per 1,000 feet.

Bark costs at the Wilcox tannery about $3 50 to $4 a cord. The company own over sixteen miles of land up and down the Philadelphia and Erie road, and bark is freighted at $4 for the car-load of twelve tons to the tannery. The freight on hides is $150 per car-load from New York, and on sole-leather $104 per car to that city.

The buildings of the Wilcox tannery cover nearly eleven acres of ground. Four steam-engines furnish the power required to drive the works. An eighty and a fifty horse-power engine run the bark and hide mills, and two, of thirty and twenty-five horse-power, are used for the rollers and machine-shops. Six double-grinder Beecher bark mills are used, which will grind 60 cords of bark a day, or more than 18,000 cords a year. This bark is then screened through a bolt, and coarse bark returned and ground over, making, they think, a great improvement, and giving a better bark for leaching than when put in unscreened. The bark is then carried along by shutes to an adjoining room, where are twenty-two of Allen & Warren's twelve-cord leaches, and they are now putting in a "Crowell leach" for trial. Layaway bark is run over a railway track from the mills to the vats.

The hides are milled in a "Yankee" or Salem hide mill, and only one of these is used. In this they milled last year 76,446 hides, and milled them over twice. This year they will work in 85,000 hides, using only this one mill.

Sweet liquors, without acid, are used in tanning exclusively, and the hides used comprise every kind of dry which will weigh from twenty to thirty pounds, or, say, an average of twenty-three pounds to the hide. In July and August, they work in green stock. They sweat all the hides, both green and dry, but give green ones a little lime afterward. Eighteen sweat-pits are used, in each of which they hang 150 hides. Two of these are brick sweat-pits, built for experiment. They work very well in cold, but are too quick in hot weather. They sweat from two to five days.

There are four yards here, but all under one roof and connected. One of them is 312 by 60 feet; another 350 by 40, and two wings, 82 by 64 and 82 by 66 feet in size, the entire yard building being 826 feet long by about 60 feet wide. In these yards are 575 double (seven by nine feet) liquor vats and 41 pools, limes, and soaks. The hides are handled and colored by reels. They tan 180 pounds of leather to the cord of bark, and have always made that average.

The turret dry house is a prominent feature of this tannery. It is built some 150 feet from the tan house, is 75 feet high, divided into eight stories, and will hang 12,000 sides of leather. It is arranged to control the draught of air and heat, and dries out stock on an average in about six days' time. Under the floor of this turret is an iron tank for oil. It holds 100 barrels, which can be pumped into the oiling room above. A hanging track runs the full length of each yard, to bring leather to the scrubber or Howard washing machine, which is on the first floor of the turret, and after this operation it is hoisted by endless chain elevators up in the turret to dry. Then by shutes leading from each floor of the turret it is thrown down into the dampening room and rolled by five rollers, the pressure being applied by a patent lever power, whence it is loaded on cars at a siding in the yard and run directly through to New York.

We are often asked if these large sole-leather tanneries are not liable to flood the market with leather, but it must be remembered that we are now finding an outlet in Europe for large quantities, and with the duty off hides, which is looked for from the next Congress, we hope for the dawning of brighter days in the tanning interest. At any rate, as the late George Appold used to say, "children won't be born with shoes on," and the demand for our leather increases every year. There are in Ulster, Greene, Schoharie, and Sullivan Counties in New York, and Susquehanna County, Pa., nearly seventy tanneries whose bark lease is about out, and located where this material is now unobtainable. These have a capacity for over 800,000 sides per annum, and all, or most all of them, will close up or greatly restrict operations during the next year or two. The bark is here, and can be obtained cheap, the facilities for transportation are good, the parties connected with the enterprise have every advantage which wealth and experience command, and we have every reason to believe that their success will be commensurate with the magnitude of their under taking.—*Shoe and Leather Reporter.*

The Hartford Steam Boiler Inspection and Insurance Co.

THE Hartford Steam-boiler Inspection and Insurance Company makes the following report of its inspections in the month of January, 1872:

During the month, there were 932 visits of inspection made, and 1,794 boilers examined—1,751 externally, and 491 internally, while 113 were tested by hydraulic pressure. The number of defects in all discovered were 1,291, of which 311 were regarded as dangerous. These defects in detail were as follows:—

Furnace plates overheated and contorted, 72—28 dangerous. Fractures, 145—86 dangerous. Burned plates, the strength being greatly reduced, 99—51 dangerous. Blistered plates, arising from a want of homogeneity in the iron, 119—25 dangerous. Sediment and deposit, 207—23 dangerous. These dangerous cases arose from the accumulated sediment preventing the water from coming in contact with the iron. The sheets were consequently overheated and buckled, and greatly weakened, unsafely so for the pressure carried. Incrustation and scale, 144—15 dangerous. External corrosion, 73—17 dangerous. Internal corrosion, 30—5 dangerous. In these dangerous cases of external and internal corrosion, the boilers in places were worn so thin that smart blows of the inspector's hammer entirely penetrated the shell. We are aware that many old boilers are worked in a fearful condition. While the pump is sufficient to supply a little more water than leaks out through cracks and corroded spots, they are considered all right. Hence many steam-users regard inspection of boilers entirely unnecessary. They hold that a boiler will tell its own story, and give them due warning far better than an inspector. The boiler does frequently tell its own story, and it is one the steam-user does not readily forget. As well might he neglect his house furnaces or stoves and expect to escape accident and harm, as to allow a boiler known to be dangerously weakened to go unrepaired. Internal grooving, 9—1 dangerous. Water-gauges defective, 44—17 dangerous. Blow-out defective, 9—1 dangerous. Safety-valves overloaded or out of order, 26—15 dangerous. Pressure-gauges defective, 139—29 dangerous. Boilers without gauges, 4. Cases of deficiency of water, 13—8 dangerous. Braces and stays broken, 51—26 dangerous. Boilers condemned, 13. There were 11 serious explosions during the month, by which 13 persons were killed and 18 wounded.

Industrial Uses of Magnesia.

THE oxyd of magnesium is a native dark-green, glassy, hard, anhydrous oxyd, found in rocks under the name of periclase, but is rarely of sufficiently pure water to be of use as a precious stone; a hydrated oxyd occurs as the mineral brucite, from which is prepared a valuable cement, and the pure oxyd for other purposes. A common way to prepare the oxyd is also to heat the carbonate. The uses of the oxyd of magnesium have latterly been considerably extended, and it is well to make note of them. Prof. Henry St. Claire Deville, of Paris, exposed a piece of caustic magnesia to the influence of a stream of running water, and after the lapse of a few months found that it had become hard like alabaster; he left it in the same position and re-examined it after seven years, and found that it had not in the least deteriorated, but, if anything, had become still harder. An analysis showed it to be nearly pure hydrate of magnesia, similar to the mineral brucite. Deville then stirred up pure caustic magnesia into a paste with water, and sealed it in a glass tube. In a few weeks this also became transparent, and proved, after analysis, to be a pure hydrate, containing 69·3 per cent. magnesia and 30·7 per cent. water. These results instigated Deville to pursue the subject further, and also to hand the matter over to manufacturers of cements. He found that a mixture of magnesia and sulphate of lime did not harden under water, but that magne-

sia and pulverized chalk or marble dust, when exposed for some time to the action of water, form a hard stone, similar to artificial marble. The magnesia which yielded the hardest mass was that prepared by heating the chloride of magnesium obtained from the bittern of salt water. The heat must not be raised to redness, as the hydraulic properties of the magnesia are diminished by too high a temperature. An important result was obtained from dolomite or magnesian limestone. This is a double carbonate of lime and magnesia, and when heated to below redness, pulverized and mixed with water, yields under water a mass of extraordinary hardness. If magnesian limestone be heated to whiteness, so as to expel all of the carbonic acid, it will no longer set under water; in other words, it loses its hydraulic property when both constituents are deprived of their carbonic acid. The lime of the mineral must retain its carbonic acid, while the heat is raised sufficiently to expel the carbonic acid from the magnesia. The result is an intimate mixture of caustic magnesia and carbonate of lime (marble), which yields a cement that hardens equally well under fresh and salt water, and appears to be admirably adapted to the manufacture of artificial building-stone. The late M. Sorel modified Deville's process by mixing caustic magnesia with chloride of magnesium; the latter ingredient can be substituted by other chlorides, but as the magnesium chloride is a waste product it is better to employ it. The caustic magnesia is stirred into a concentrated solution of chloride of magnesium, and the more concentrated the solution is, the harder will be the cement. This cement becomes perfectly white and very hard. It can be poured into molds, the same as plaster-of-paris, and as any color can be mixed with it, it can be used for the repair of different kinds of building-stones, as well as in the imitation of a variety of fancy articles. It serves a good purpose as a coating for soft limestone or plaster casts, and for this purpose may be applied with a brush. The cement made by dissolving calcined magnesia in chloride of magnesium is employed as the basis of the manufacture of artificial stone in Boston; by mixing the prepared cement with sand, a peculiar brick is formed; by employing flint, whetstones and hones are made; with kaoline, ornaments of all kinds, statuettes, imitation porcelain, etc., are produced; with sawdust, it gives a good material for covering floors; with carbonate of lime, imitations of marble. Whether it is preferable to use Sorel's method of caustic magnesia and chloride of magnesium, or to adopt the plan proposed by Deville, and make an intimate mixture of carbonate of lime and caustic magnesia, must largely depend upon the cost of the material.—*Prof. Joy, in Jour. Applied Chemistry.*

Mighty Meteorites.—Late foreign papers contain accounts of three enormous meteorites (said to be the largest known) discovered in Greenland, weighing 49,600 lbs., 20,000, and 10,000 lbs. respectively. Two of them are now in the national museum at Stockholm.

The manufacture of Etruscan jewelry is one of the lost arts. Jewelers say there is no method known to modern science which will enable them to reproduce antique specimens.

There are 40,000 orange trees in Los Angeles County, Cal., which produce an average of 1,000 oranges per tree. The gathering season commenced about the first of January.

A New Stove.

The Berlin correspondent of the London *Times* writes:—"As we hear so much of coal threatening to come to an end, it may not be uninteresting to notice a German invention which goes far to treble the effect of the black diamond consumed in heating rooms. On the last German Arctic expedition preparing to set out for the North Pole, Captain Coldevey made a public appeal to natural philosophers for a stove which would suffice for the needs of so cold a climate. Of the various patterns submitted to him, the one invented by Professor Meidinger, of Carlsruhe, was pronounced the best. It has stood the test, and having done excellent service on board ship, now begins gradually to insinuate itself into German households. Nothing can be more simple than the construction of this excellent apparatus. It is an iron stove having a double wall, with a space about two inches wide between the outer and the inner one, to which the air has free access above and below. The cold air being always at the bottom and the warm air ascending, it follows that all the air in the room is being constantly forced through the space between the outer and inner covering of the stove, or, what is the same, is being constantly heated. Connected with this is another ingenious device. The coal is put in from the top, and fills the whole inside of the stove, which is about six feet high, more or less. It is lighted at the top and kept burning by the draught created by valves, inserted both in the side walls and at the bottom of the stove. The more valves open, the greater the heat, so that the temperature of the room can be regulated to a nicety. At the same time, the outer wall, being at a distance from the inner one, never reaches the excessive heat so great an objection in ordinary iron stoves. The expense of fuel is about a third of that incurred in a porcelain stove as used in Germany, and, I should say, one-sixth of an English fireplace. No wonder, then, that elegant specimens of the new invention—not half as dear as our porcelain erections—are making their way into many a dwelling."

The Steam-jacket.

There is a practical objection to the use of the jacket to which we have not yet referred. High-pressure steam, especially if quite dry, appears to exert a peculiar solvent effect on cast-iron. Already we hear rumors in numerous directions of the rapid wear of the high-pressure cylinders of compound engines, an evil which grows in proportion with each augmentation of the weight of the casting. It appears to be fortunate that the remedy for this evil affords the best possible method of applying the true theory of the jacket in practice. In certain cases the jacket is made by putting a thin steel tube into a cast-iron cylinder bored out to receive it. The Reading Works Company have brought this system of construction to great perfection, for example, with excellent results. How far the scheme is applicable to marine engines we are unable to say. We suggest that, especially in marine engines, instead of steel—notably an uncertain material—hard brass, or more strictly speaking gun-metal, liners should be used for the high-pressure cylinders. Properly made, the material is much harder than cast-iron, and will take a beautiful surface; while the material, being an excellent conductor, would comply with one of the fundamental conditions of eminent success in using the jacket. The idea is a mere extension of the system of lining air-pumps. We do not claim it as original, but we believe this is the first time the scheme has been mentioned in any journal; and it appears to us to be well worth the consideration of engineers engaged in the construction of large steam-engines working with considerable pressure.—*The Engineer.*

German Mining Tunnels.

In the Freiberg silver-mining region of Germany, two tunnels of extraordinary length have been driven to drain the veins far below the lowest levels. One of these great works, twenty-four miles in length, is driven from the river Elbe, the intention being to cut the veins at an average depth of nearly 2,000 feet. This enterprise was projected more than twenty years ago, and although on account of its magnitude it was much opposed, yet it was vigorously supported by Von Beust and other eminent mining engineers, and received the sanction of the Saxon Government. The peculiar characteristics of these veins, which indicate that they fill true fissures, are pointed out as strongly encouraging to the undertaking. Whether it has been completed we are not able to say, but our impression is that it was finished a few years ago. The southern part of the Freiberg district is drained by an adit which is driven from a small stream called the Triebsche, near the village of Rothschönberg, and extends over eight miles, or about the projected length of the Sutro Tunnel. At the time this work was begun, it was expected to drain the veins at a depth of 400 feet below the lowest point reached by the system of drainage which was then in use. This adit is more than eight feet wide, nearly ten feet high, and rises in the whole distance nearly thirteen feet.

South American Saltpeter Mine.

We find the following in an exchange, given on the authority of Mr. Smith, who has seen the mine referred to. If the story is true, the artificial salpeter heaps common in Europe will doubtless, some time in the future, prove a profitless vexation to their owners:—"An Indian, by the name of Negvevos, about the middle of the last century, discovered a bed of saltpeter in a pampas near the base of the Cordilleras. Mr. Smith says beds of it at Tamarugal extend through a pampas 483 miles. In some places the pure article is ten feet thick. If 110 pounds may be estimated for a yard, being the very lowest calculation—it is assumed that 63,000,000 of tuns are lying there—there is enough for all the requirements of commerce and manufacture for one thousand three hundred and ninety-three years at the present rate of consumption!"

American vs. Foreign Building Practice.

It is asserted that the Hôtel Dieu, the new half-finished hospital in Paris, in the construction of which the late Empress was warmly interested, and upon which millions of francs have been expended, is built without regard for and in opposition to hygienic principles; and, in consequence, several wings of the structure must be pulled down. How absurd! If we in the United States make such a blunder as this, do we think it necessary to alter the position of one single brick? Not at all. The architect publishes a card, all the attending doctors prepare elaborate statements, all the trustees send communications to the newspapers; and thus it is proved that the aspersed building is one of the best constructed in the world.—*N. Y. Tribune.*

NEW AMERICAN PATENTS.

We give, as follows, notices of some of the most interesting inventions for which Letters-Patent of the United States have recently been issued :—

Process for maturing and curing Green-leaf Tobacco.—J. Ashcroft, Brooklyn, N. Y.—*Feb.* 20.—This process consists in suspending the tobacco, and subjecting it, in a partially closed chamber, to heat, introduced therein by conduction and a direct and forced current of common or dried air, to create a circulation through and agitation of the leaves to carry off the vapors. The apparatus consists of a chamber with a steam-space around it, with appliances for suspending the green tobacco therein, and inlet and air passages for introducing and creating circulation of air through and agitation of the leaves of tobacco, and carrying out of the chamber the vapors thereof.

Method of drying Napped Cloth.—W. Chapin, Staffordsville, Conn.—*Feb.* 20.—This method of extracting the water from the cloth after it has been napped, comprises revolving it upon a spindle and while on the roll.

Self-acting Water-valve.—J. N. Deck, Buffalo, N. Y.—*Feb.* 20; ante-dated *Feb.* 17.—This inventor claims the combination with induction and eduction pipes, a partitioned valve-chamber, a valve, and mechanism for automatically actuating the valve, of a flexible diaphragm, constructed and arranged to counterbalance the pressure on the valve of the water in the induction-pipe, and thereby insure a supply of water in the service-pipe under all degrees of pressure in the main.

Sewing-machine Treadle.—C. A. Foster, Providence, R. I.—*Feb.* 20.—This invention is constituted by a spring-joint composed of a spring and a fulcrum applied in combination with a treadle and rest. Also, by springs arranged in suitable relations with the treadle and fulcra, for the purpose of keeping the treadle in contact with the feet.

Manufacture of Metal-coated Sheet-iron.—B. Morison, Philadelphia, Pa.—*Feb.* 20.—This consists in deoxydizing the scale oxyd adherent to sheet-iron, and amalgamating, blending, or intimately uniting it with any of the softer or more fusible metals. There is also claimed, as a new article of manufacture, sheet-iron having a surface coating consisting of the deoxydized scale oxyd amalgamated with any of the softer or more fusible metals.

Tooth-pick Machine.—S. Noble and J. P. Cooley, Granville, Mass.—*Feb.* 20; ante-dated *Feb.* 1.—In this apparatus are used cylinders, arranged in such manner that the knives on one of the cylinders shall operate upon the revolving log in the spaces not operated upon the other cylinder. The invention also includes a standard constructed with curved grooves to compel the knives of the two cylinders to operate properly in relation to each other, whatever may be the diameter of the log.

Leveling-jack for Billiard-tables.—C. Paxton, Loveland, Ohio, and W. H. Hull, Coffeyville, Kansas.—*Feb.* 20.—This new article of manufacture is a leveling-jack, consisting of an upright bolt, which has three or more projections on its bottom, and supports a screw-cap, the top of which rises toward the center, and there projects upward in a sharp point.

Dredge-box.—W. S. Potwin, Chicago, Ill.—*Feb.* 20.—The gist of this invention is found in a perforated cap or cover made in one and the same piece, and having its perforated portion depressed or surrounded by a ridge, in combination with a sealing disk, arranged thereon within said depression or ridge, so as to seal the perforations.

Candle Lamp or Holder.—M. Weis, Boston, Mass.—*Feb.* 20.—This improvement embraces the combination in a candle lamp, constructed with a rim and holder, engaging with each other by means of lugs and projections or bayonet catches, of bowed springs secured at each end to the case of the lamp, and provided with a pin or bolt midway between its two ends, operating in connection with the holder.

Gopher Trap.—J. Bowman, Santa Cruz, Cal.—*Feb.* 20.—The essential features of this improvement comprise a pivoted cap in combination with the perforated end of a gopher trap, which is open at its opposite end, and provided with suitable mechanism for closing the same. Also, the combination of a swinging-gate, sliding-rod, spring, and trigger, with a tube suitably arranged.

Machine for cutting Files.—A. Weed, Boston, Mass.—*Feb.* 20.—This invention embraces the combination of mechanism to automatically move the cutter over and behind the tooth just previously cut, and to then carry it forward to and against the spur of said tooth, and the utilization of the spur of each successively made tooth as a means of properly gauging the proper position of the cutter for the next fall of the hammer, and as an instrument in connection with the cutter for securing a proper succession of the cuts upon and along the surface of the blanks.

Registering Steam-gauge.—E. H. Ashcroft, Boston, Mass.—*Feb.* 20.—This claim covers the combination with a steam-gauge of a supplementary steam-chamber and pressure-spring, actuating a registering-index by means of a suitable pawl and ratchet wheel, for indicating each time the pressure has been allowed to exceed a certain limit; the whole being so arranged that, while the ordinary range of pressure is being constantly indicated in the usual manner, the said supplementary steam-chamber, with its dependent mechanism, is called into action for registering extraordinary pressures.

Self-centering Chuck for Lathes.—G. O. Buckley, New Bedford, Mass.—*Feb.* 20.—This improved self-centering chuck, constructed with a single series of radial screw wedges to its inclined-plane jaws, with each jaw having but one inclined plane, and with a collar to screw upon each of the wedges, and so applied to the jaw-carrier as, when in operation, to have no longitudinal movement, but simply a rotary movement thereon.

Apparatus for suspending Glass Bowls under Gas-burners.—J. C. Connor, New York City.—*Feb.* 20.—This apparatus consists in the combination with a horizontal burner of a bracket projecting above the burner and over the same, and an adjustable plug. Also, in the burner and bracket projecting over the same, in connection with a water-bowl attached thereto by a supporting cord or bail.

Steam-boiler Furnace.—C. H. Fox, New Orleans, La.—*Feb.* 20.—The noticeable features of this novel furnace include one or more deflectors suspended by water-pipes. Also, deflectors suspended as described, and provided with air-spaces or tubes. Also, the water-pipes connected to the steam-space as a support, in combination with fire-brick lining or deflectors. Also, a novel arrangement of the grate, suspended crown, deflectors, and bridge-walls suitably constructed and arranged.

Machine for drying Yarn.—R. Hartmann, Chemnitz, Saxony.—*Feb.* 20.—This inventor claims, in an apparatus for drying yarn, the arrangement of two endless chains traveling in a zigzag course through a heated chamber, said endless chains being provided with sockets and recesses for the reception of skein-supporting traverse rollers. Also, pinions on the skein-supporting traverse rollers, in combination with racks acting on said pinions, and imparting to the traverse rollers an intermittent revolving motion. Also, levers and weights in combination with the racks acting on the pinions of the skein-supporting traverse rollers.

Distilling Coal-oils.—S. Hudson, Plainfield, N. J.—*Feb.* 20.—The novel characteristics of this improvement consist in distilling burning oil from petroleum by the use of a condenser of a temperature as high as the fire-test of the oil, and passing away the uncondensed vapors freely and directly to the atmosphere. Also, in combination with the foregoing, of an open shallow trough, receiving the oil as it runs from the still, and exposing the same to the atmosphere.

Fenders or Cushions for Furniture.—George R. Willmott, Meriden, Conn.—*Feb.* 20.—This invention relates to what are known by upholsterers as fenders or cushions. They are applied to the backs of various articles of furniture to prevent them from bruising or soiling the walls of an apartment or other surfaces with which they are liable to come in contact. Its object is to secure the cloth covering to the body of the fender more expeditiously, and in a manner as shall also add to its neatness and security. It consists in the novel combination of a shell or body, a back-plate, and a cloth covering, whose edges are wedged in between said plate and the interior of the shell; the edge of the latter being bent over to more firmly grip the cloth, and also to secure the back-plate in place.

Furnace for smelting Iron and other Ores.—Samuel Washington Harris, Hudson, N. Y.—*Feb.* 20.—This invention relates to what are commonly known as "blast furnaces," in which a hot blast is used. It has for one of its objects the economy of the gases evolved in the smelting process, and their conduct in a cold, dead state, by proper channels, to any desired place or places, where they are to be used for heating the pipe-ovens or steam-boilers, or for illuminating and other purposes. Other objects of it are economy of fuel, increased production and improved quality of the metal, and the regulation of its quality and increased durability of the upper part of the furnace. The improvement consists in providing the top of the furnace with a cover in or under which, and above an opening or openings provided for the exit of the gases to the place or places where they are to be utilized, are one or more doors, which are capable of being opened easily for the introduction of the ore, fuel, and flux into the furnace, but which are closed immediately after charging, such cover being also provided with an opening in the top of suitable size for the escape of any surplus gas, and with a damper to regulate such escape.

Sewing-machine.—Thomas Hall, Florence, Mass.—*Feb.* 20.—The first part of this invention relates to shuttle sewing-machines, and it consists in a shuttle having a compound movement, which causes its point to move in a different line from its heel and in close proximity to the cloth-bed, when entering the loop, and afterwards to tip or tilt to effect the extension and clearance of the loop and tightening of the stitch. Such compound shuttle movement admits of a shorter and consequently stronger needle, and a shorter needle-stroke, being used, inasmuch as the eye of the needle needs only to project a little below the cloth-bed, which is of especial advantage when curved needles are used; and besides this, by such movement the loop is very perfectly spread, and caused to slip very easily over the heel of the shuttle. The invention likewise includes certain mechanism for communicating such compound movement to the shuttle; also, a peculiar construction of the shuttle with its point arranged to project below its bottom; and furthermore, a peculiar construction of the shuttle-carrier for holding the shuttle down to its place. The invention furthermore includes a simple arrangement for obtaining the lift of the feed-bar by a toe on a sleeve or shaft connected with the shuttle-carrier, also an arrangement of devices whereby the motion to effect the feed is derived from the same crank that drives the needle.

Packing.—George Gwynn, New York City.—*Feb.* 20.—This invention consists in a novel preparation of the fabric of which the packing is composed in part or in whole, whereby it is not only made close and durable, but, when applied to a rod or working part, avoids heating and is self-lubricating.

Paper-cutting Machine.—Patrick H. Hopkins, Brooklyn, N. Y.—*Feb.* 20.—This invention relates to machines for cutting paper in piles for bookbinders' use and other purposes, and consists in a novel and simple means of balancing and operating the knife, including devices for automatically tripping the knife after it has completed its cut, and whereby it may be automatically and rapidly raised ready for the next cut.

Wheel for Traction Engine.—Douw D. Williamson, New York City.—*Feb.* 27.—The object of this invention is to provide wheels for traction engines or self-moving carriages which, in addition to possessing all the advantages of a continuous rubber tire protected by metal armor, shall be cheaper, lighter, and more durable, and shall have greater adhesion. To this end, it consists in the novel construction of a wheel having a metal felly or fellies, and a series of rubber springs protected by metal tread-plates or shoes, and so secured as to admit of their compression.

Machine for making Staples.—John Adt, New Haven, Conn.—*Feb.* 27.—This invention con-

sists in certain combinations of devices for making staples from a continuous length of wire without heating the latter, yet with the points drawn out as distinguished from being sheared, and resulting in a great economy of time, labor, and fuel, as compared with the ordinary process of making staples.

COWL FOR EMERY WHEELS.—Charles Heaton, New York City.—*Feb.* 27.—This invention consists in a cowl of novel construction for emery wheels and other grinding wheels, and in a novel mode of attaching the cowl to the grinding machine, whereby, in case of the breakage of the wheel, the workman is effectually protected from the broken pieces, and convenient provision is made for the quick and secure adjustment of the cowl to any desirable position.

RIGGING SCREW.—John R. Anderson, New York City.—*Feb.* 27.—The object of this invention is to enable one rigging-screw to be used for different-sized rigging. To this end, it consists in a series of pairs of removable clamps of various sizes, which are secured within the jaws of the rigging-screw in such manner that they may be easily changed, and the whole operated in the same manner as an ordinary rigging-screw.

Outlook of Southern Industries.

SAYS the New Orleans *Weekly Times*:—"It is gratifying to observe the progress we are making in industrial developments, and the new fields opened by enterprise and ingenuity to our people. Before the war inventive skill was almost exclusively confined to the North and West; now every week inventions are patented by Southern patentees. Before the war our brooms were all made in the North and West; now they are chiefly manufactured in this city. Our cotton-seed oil and seed-cake factories are the largest and best in the entire country. Our iron foundries begin to take high rank, though there is still a wide margin for improvement. Thousands of tuns of old iron are every month shipped to Cincinnati and the North which ought to be reconverted into articles of use and value in our own smelting furnaces and rolling-mills, and which will be as soon as we are provided with the proper means and appliances. We are gradually multiplying our industries, especially the small ones, which utilize what otherwise might be wasted or yield but little. In the establishment of a paper factory on Liberty Street, there is hopeful promise of important results. Paper-stock is more abundant here than in any other portion of this continent. The small price it commands and the high rates of freight exacted for conveying it to the established paper factories of the North, leave to dealers but an exceedingly small margin for profit. Convert it into paper here and we supply a constantly existing demand in our own market, distribute a reasonable manufacturers' profit among our own people, and at the same time furnish useful employment to a class of our population which might otherwise be idle. Just here we may add that, owing to the limited number of small industrial enterprises in this city, we have a superabundance of unskilled manual power which is now running into vagabondage, but which, with satisfactory means of employment, would become not only useful and self-sustaining, but largely profitable to the general community. Idle hands and idle brains are fruitful sources of mischief, while, on the contrary, busy hands and brains are the sure foundations of a people's wealth."

Road Steamers for Colorado.

ACCORDING to the Greeley *Tribune*, Mr. Marshall, proprietor of a Colorado coal mine named after him, has sent to England for a road steamer, to be used in hauling coal over the common road from his mine to Denver, distance 25 miles. The cost, on reaching New York, is $5,000. This steamer will haul from 10 to 20 wagons holding from two to three tuns each, and it is expected that coal can be delivered in Denver at $1 a tun, that is, putting the coal in market at from $3 50 to $4.

Should this steamer do as well as is claimed, it seems, says the *Tribune*, that it will work a revolution in Colorado in regard to transportation. Our roads are so remarkably good that the steamer will meet with no obstacles in this respect, and as the rate of travel is from 8 to 10 miles an hour, the necessity for railroads is diminished. What Colorado wants more than anything else is means of quick and cheap transit from one place to another. If this road steamer should do its work well, we in Greeley must have at least one; indeed we should have half a dozen. In India, a country quite similar to Colorado, there are now several hundred in successful operation. First, one can be employed running to La Porte and one to Boulder, carrying grain, coal, stone, merchandise, and also passengers. When once set running, they would soon become profitable, and business would at once become brisk. These steamers will plow two acres an hour, or twenty acres a day, and stir the soil from 8 to 12 inches deep. They will also thrash, or do any other work where power is required.

Iron Ship-building in the West.

A FEW days since, articles of association were filed in the office of Secretary of State, of the Western Iron Ship and Boatman's Building Company, the business to be carried on in the city of St. Louis, the object to be to build wharves and docks, ships, steamboats, barges, and other water-craft. The capital stock is placed at $3,000,000, and may be increased by a vote of the stockholders to any amount not exceeding $10,000,000.

The Navy of the Future.

A SEMI-OFFICIAL communication to the London *Times* prepares the way for an application to the British Parliament for funds to build a ship of war which possesses the merit of novelty of construction. The new vessel is to carry the armor-plating on the bottom, leaving the top sides unprotected, and, to compensate for this disposition of weight, the coals and stores and cables will be above the water-line. She is to be armed with submarine rocket-tubes for the protection of rockets possessing the inherent property of preserving a given depth of immersion, and which will explode a charge of gunpowder or other explosive on coming into contact with any solid substance, such as a ship, and hence called a "fish" torpedo. Bold as is this newest essay after novelty, we confess that before launching into the enormous expenditure attendant on the building of a bottom-armored ship, we think a few tentative experiments might well precede the outlay, in order to ascertain the properties both of the bottom-armor and of the submarine rocket or fish torpedo.

It does not appear very clear why a torpedo vessel, of all others, should carry bottom-armor, unless especial danger be apprehended from her own weapon. We should have supposed that a torpedo vessel had more to fear from the guns of the ship attacked, than from torpedoes other than her own. A torpedo vessel with light upper works approaching an iron-clad would naturally be exposed to heavy artillery fire, against which bottom-armor would be no protection. Indeed, in such a duel, the positions of the armor in the two ships had much better be reversed—the gun ship be armored below, the torpedo one on top. But there is not a single experiment extant to show what thickness of bottom-armor will resist a given explosive charge. We know that 150 lbs. of gunpowder, placed 19½ feet from the bilge of a wooden ship-of-war, drove her bottom through the upper-deck, making a hole large enough to drive a coach and six through. We know also that a charge exploded against a strong submerged target with an iron-tank backing smashed in the air-tight backing, even when the face of the target was uninjured. But what would be the effect of exploding 150 lbs. of gun-cotton or dynamite in contact with the armored bottom of a ship has never been ascertained, as it might easily be by fastening a section of a well-constructed vessel against the bottom of an old ship. We do not know that the bottom-armor would save the ship even from her own torpedo, which appears to be the chief object.

Then, as to the fish torpedo, no experience has been obtained with it, except a close experiment made at Sheerness, witnessed by very few officers, and by none who had made torpedoes their special study. The fact that its construction and use is a secret shows that no useful experience has been obtained with it. It is generally known that it has powers of maintaining a given depth of immersion, that it proceeds very slowly through the water, that all control over it is lost the moment it is liberated from the operating vessel, and that it explodes on making contact with any vessel, friend or foe. Now, it follows from this that a self-acting dangerous mine being set adrift in the midst of a fleet, and missing its mark, occupies an unknown position a few feet beneath the surface, and may easily come into destructive contact with friendly vessels, if not with the operating one herself whilst performing the gyrations and maneuvers incidental to a naval action. Such a weapon must be a fruitful source of danger to the fleet in which it is carried, unless some means be provided by which its ignition will be effected or prevented on the lapse of the estimated time for reaching the ship aimed at. Even then, great danger may arise from friendly vessels unknowingly intercepting the path of the fish torpedo. Surely, experiments to discover the means of safety might well be conducted with some old vessel before building an expensive sub-armored ship, to carry a weapon which may subsequently be proved to be more dangerous to its friends than its foes. Meanwhile, we have safe naval torpedoes, requiring but a few thousand pounds and a few intelligent experiments for their full development. If some of the £15,000 given for the paper describing the fish torpedo had been devoted to careful experimental investigations as to the properties of the outrigger and of the towing torpedoes, we should probably long ago have possessed safe naval torpedoes which could be employed by any steamship afloat, however built. As it is, we are rushing into a heavy expenditure in building a novel vessel, without a single tentative experiment to justify the supposition that bottom-armor will be effective against torpedoes, or that a fish-torpedo can be safely and usefully employed whilst no protection is to be afforded to the discharging vessel against guns, which are the only weapons she need fear, except her own. —*Mechanics' Magazine.*

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VOL. XIV. NEW SERIES. 1872.

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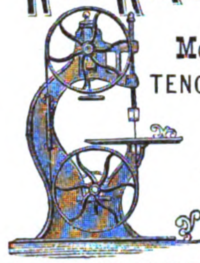

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VOLUME XIV. New Series. } NUMBER 11. NEW YORK, MARCH 13, 1872. { $2 00 PER ANNUM IN ADVANCE. SINGLE COPIES, FIVE CENTS.

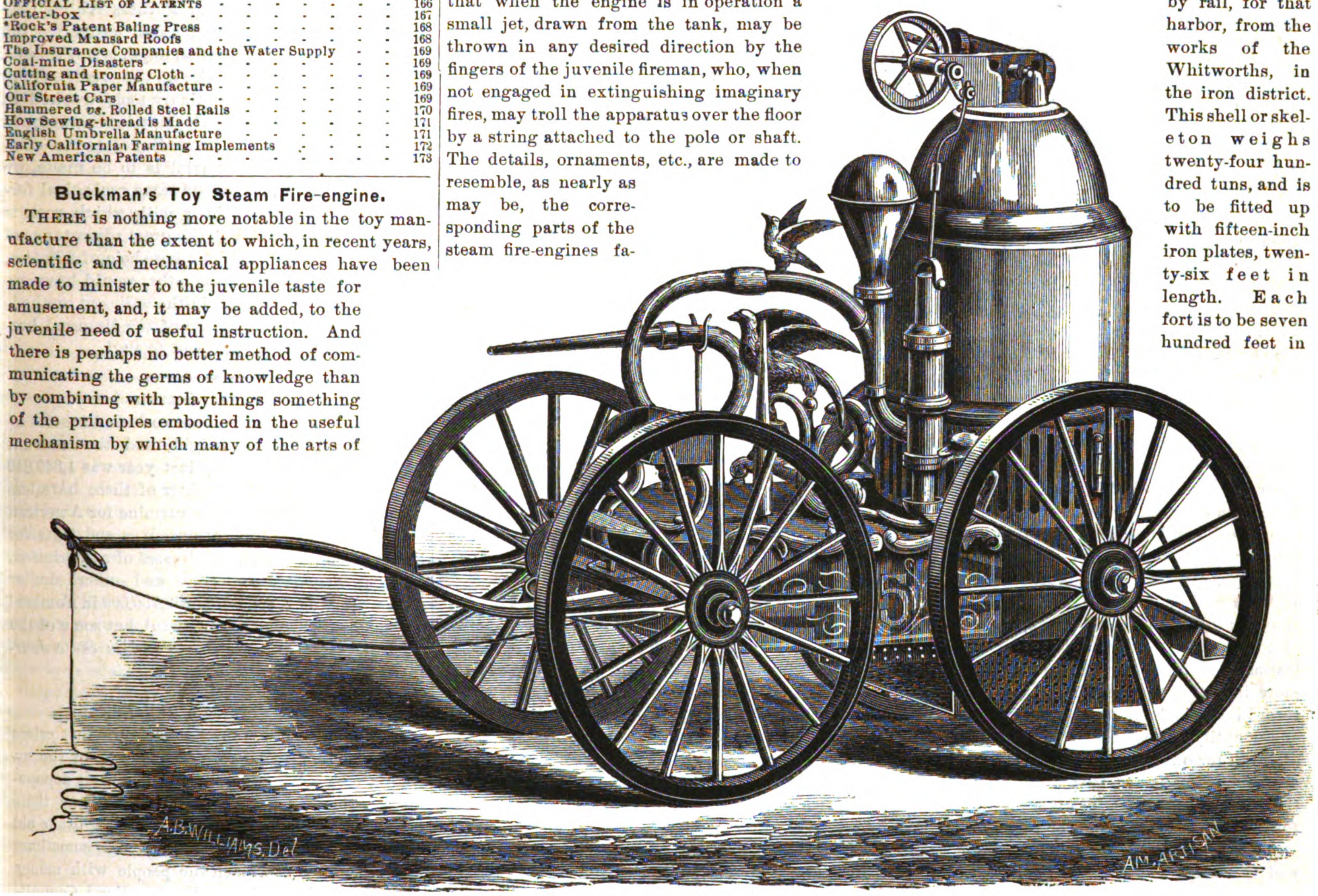
CONTENTS OF THIS NUMBER

[Illustrations are indicated by an asterisk.]

Buckman's Toy Steam Fire-engine.

THERE is nothing more notable in the toy manufacture than the extent to which, in recent years, scientific and mechanical appliances have been made to minister to the juvenile taste for amusement, and, it may be added, to the juvenile need of useful instruction. And there is perhaps no better method of communicating the germs of knowledge than by combining with playthings something of the principles embodied in the useful mechanism by which many of the arts of life are carried on. Of toys of this class, few have proved of greater popular interest than the toy steam-engine, one of the common forms of which is shown in the accompanying engraving in a new *rôle*, that of driving the pump of a toy steam fire-engine, in a manner closely analogous to the operation of the improved fire-extinguishing machinery that has, during a few years past, been adopted in most of our cities.

Only a brief sketch is needed to render intelligible the leading features of this new toy. The upright boiler is placed at the rear of the tank which forms the body of the wheeled vehicle that carries the whole, the lamp by which the boiler is heated being arranged underneath the same, while the engine cylinder and its few and simple adjuncts are provided upon the top of the boiler. The crank of the engine connects by a pitman with the plunger of a vertical piston-pump, which latter has a suitable air-chamber connected therewith, and an outlet to which the hose, furnished with a miniature nozzle, is attached, so that when the engine is in operation a small jet, drawn from the tank, may be thrown in any desired direction by the fingers of the juvenile fireman, who, when not engaged in extinguishing imaginary fires, may troll the apparatus over the floor by a string attached to the pole or shaft. The details, ornaments, etc., are made to resemble, as nearly as may be, the corresponding parts of the steam fire-engines familiar in New York and other city streets, the toy forming by no means the least instructive as well as pleasure-giving toy of the period. Application for a patent on this novel toy has been made, through the "American Artisan Patent Agency," by the inventor, Alexander Buckman, of Brooklyn, N. Y. It is manufactured by the Buckman Manufacturing Company, whose store is at No. 634 Broadway, New York City.



BUCKMAN'S TOY STEAM FIRE-ENGINE.

NEW GAS COMPANY.—Jersey City, N. J., is to have a new gas-light company, with a capital of $2,000,000.

English Sea-coast Forts.

THE iron sea forts now in course of construction for the defense of the prominent naval stations of Great Britain, will, with the foundations, cost five million dollars apiece. The iron shell of one of the forts for Spithead, near Portsmouth, has been shipped by rail, for that harbor, from the works of the Whitworths, in the iron district. This shell or skeleton weighs twenty-four hundred tuns, and is to be fitted up with fifteen-inch iron plates, twenty-six feet in length. Each fort is to be seven hundred feet in circumference and two hundred and thirty feet high. They are to be armed with two tiers of guns, one tier of twenty-four 600-pounders and the other of twenty-five 400-pounders. The guns, it is calculated, will pierce twelve-inch armored ships at two thousand yards' distance.

IT is estimated that during the last five centuries more than $250,000,000 worth of land has been washed away from the eastern coast of England by the encroachments of the sea. A number of villages and towns which used to be set down on the old maps have entirely disappeared.

How Car-wheels are Made.

THE car-wheels made at the works in Ramapo, thirty-three miles from New York City, on the Erie Railway, are now used under passenger-cars on all the principal railroads in the United States, large shipments of them have been made to railroad companies in South America, and, while at the office, we saw a letter from Russia, making inquiry about the wheels, with a view of purchasing some of them as an experiment, as at present the wheels used in Europe are made of wrought-iron, which is less serviceable than the chilled cast-iron wheels. All the Pullman cars are supplied with them, and so are over half the trucks put under new locomotives in the country. The company received orders for nearly twenty thousand wheels during the last half of 1871, and they have orders for four thousand wheels ahead of manufacture. The new foundry, in addition to their previous works, will increase their capacity for production of good wheels to seventy-five thousand a year.

The process of casting car-wheels is interesting, and we will briefly describe it. Each molder—the Ramapo works being large enough to accommodate twelve—has a crane with a sweep large enough to place the molder of from twenty to thirty wheels. An iron rim, of the shape of the tread and flange of the wheel, is used, and a wood pattern is then put in and fine casting sand sifted upon to cover the casting surface, and then shoveled in and tamped down. The other side of the mold is made in a similar manner, but before the two are put together, a "core" made of sand and flour, and baked, is laid in, to make the hollow in the wheel. The two sides are then put together and clamped, and the mold is ready for casting. All the handling of the molds, as well as pouring in the melted iron and lifting out the red-hot wheels, is done by the crane. As many molds for wheels are made as there is room in the circle of the crane-arm. While the molders and helpers have been busy each morning making the molds, other workmen have been equally busy in filling three or four furnaces with iron and coal. In one of the furnaces they put about twenty tuns of pig-iron and four tuns of the best Lehigh coal, showing that a pound of coal will melt five pounds of iron. After the fires are started, and the iron begins to melt, which takes only about an hour, more iron and coal are thrown in. An accurate record is kept of the weight and kind of the iron and quantity of coal used each day. A red stream of iron runs out of the furnace into a tipping receptacle, which is operated by steam-power. Little truck-wagons, with pots holding enough metal for a wheel, are backed up to the tank of metal, which is tilted so as to fill the pots on the trucks, and the helpers draw them about the foundry. The trucks and pots are lifted by the cranes, and each molder easily pours the iron into the molds he has made. After a few have been filled, he takes off the tops, and lifts the red-hot wheels with the crane; they are then transferred to a sort of windlass suspended from a railroad track overhead, with which they are carried into an adjoining room, where are the "tempering pits." These pits are iron cylinders, sunk in the ground, and about sixteen of the red-hot wheels are lowered into them, the top covered, and they are left for two or three days that they may cool gradually, which adds much to their strength and durability.

The sight in the molding-room, when the castings are being made, is grand beyond description. The glowing streams of molten iron pouring into the tanks, and from thence into the truck-pots, cast a vivid light upon the workmen and all the surroundings, and put one in mind of a place where "thin suits" are in constant demand.

The wheels as made will average about five hundred pounds each, and sell at an average price of $21. Each wheel is numbered, and a record kept of the kinds of iron used, when and by whom made, so that in case it fails the cause may be traced out. The same careful system is observable through every department of the works. During the casting, tests of the iron are made from time to time, to show that it possesses the proper "chill"—that is, to see how deep the hardness occasioned by coming in contact with the iron rim in the mold and suddenly cooling extends. If not just right, other brands of iron are added in the furnace to produce the proper result. A great many styles of wheels are made, including one patented by Mr. Snow, the superintendent, who seems to have a thorough and comprehensive knowledge of the business in all its details, and is the right man in the right place. Many conveniences and improvements about the foundry, to facilitate work and save labor, have been provided under his direction.

In the machine-shop are machines for boring the wheels, turning axles, and a hydraulic wheel-press for forcing the wheels on to the axles. While in the shop we saw wheels, ordered by some railroad company in Connecticut, put on axles at a pressure of fifty tuns, and were told that one hundred and twenty-five tuns had sometimes been exerted by the press in forcing on the wheels. The usual pressure, however, is about thirty-five tuns. With a large boring machine in the shop, sixty car-wheels have been bored in ten hours. There is also a pattern-shop connected with the establishment, in which workmen are steadily employed in making patterns for new styles or sizes of wheels, or repairing the old ones. The company also make such castings as may be required about the works, which necessitate many patterns.—*Berkshire Courier.*

Novel Locomotive Spark-arrester.

ACCORDING to the Boston *Transcript*, a Massachusetts inventor has brought out an important improvement in the way of a new spark-arrester for locomotives. It is described as comprising a curved smoke-stack, in nearly the shape of a "horn of plenty," attached as ordinary smoke-stacks are, the mouth running backward toward the center of the locomotive. Within, near the enlargement at the upper curve, is placed a wire screen at an angle of about 45° with the direction of the smoke, and the usual screen is placed over the immediate outlet. Just below the first screen a perforated steam-stack is run horizontally through the smoke-stack, connected with the boiler by a valve-pipe under the control of the engine-driver. As the refuse matter from the furnace passes through the stack, it is moistened by the fine spray ejected from the perforations, deadening the particles and increasing their weight. Striking at the inclined angle named above against the first screen, they are prevented from passing through, and fall to the under curve of the stack, whence, through the natural motion of the engine, they are directed by a tube to beneath the boiler, and thrown upon the track in a moist and consequently harmless state. This invention has been on trial upon the Fitchburg Railroad during a few weeks past with sufficient success to warrant the inventor in pushing his plans. The advantage of the curved stack is not only in the prevention of dust and cinders upon the train, but to avoid the damage by fires along the track, which have been the cause of so much expense to railway companies. It was at first supposed that the draught would be so seriously checked by the new stack as to counterbalance the other advantages, but experiments have shown that such is not the case, and that steam is made as well as with the ordinary stack.

Diamond Drills in England.

A FOREIGN exchange makes mention of a new diamond drill devised by one Captain Beaumont, and on trial in the Cleveland (England) iron district. Its work has been completed at the locality of Stanghow, where at a depth of 689 feet the ironstone was reached. The machines are in great requisition in the Whitehaven and Furness districts for "prospecting" purposes. A trial bore for coal has been made near Furness Abbey; geologists being of opinion that coal underlies the new red sandstone, but at what depth is not known. The diamond borer is to take up the work where it has been left by the ordinary tools worked in the customary method. By Captain Beaumont's machinery the bore will be continued to an enormous depth. A similar trial is to be made, we hear, near Belfast, where the same geological formations exist. The rapidity with which rock is pierced constitutes one of the great advantages of this system. The Cleveland bore-hole of 689 feet, pierced in less than two months, would have required two years of work in the ordinary method. There are now about a dozen of the diamond boring machines at work or about to start.

Cochineal Insects.

IT takes sixty-five thousand cochineal insects to make one pound in weight, and the amount imported into this country last year was 1,849,842 pounds. The annual slaughter of these harmless insects, therefore, to supply carmine for American ladies' toilets, and the various dyes and tints for their ribbons, feathers, and dresses of red, crimson, scarlet, magenta, solferino, and other similar colors, actually reaches 120,239,730,000 in number! These figures are perfectly awful, but some of the uses of carmine are worse.—*Virginia State Journal.*

The Steam Plow as a Philanthropist.

THE ruling passion is as strong in great crises of life as in death, if we may judge by the accounts which come to us from the almost depopulated regions of France of the work done there by our friends the Quakers. While other aid societies made use of intricate and sometimes tardy machinery to reach the people with money or food, the Friends' War Victims Fund Committee concentrated their means and repaired to the neighborhood of Metz, where famine and pestilence had done their worst. "With a Fowler's steam apparatus, conveyed from England through immense difficulties, and by a system of organized manual labor, they succeeded in cultivating and seeding all that region in an incredibly short space of time." The succor thus afforded to Metz and its neighborhood alone was valued at 500,000 francs.—*Pall Mall Gazette.*

AMERICAN OYSTERS IN ENGLAND.—American oysters in the shell are now sent in large quantities to England. A Liverpool firm has organized a tri-weekly importation of 150 barrels, containing in each about 1,200 oysters.

The "New Light."

THE editor of the *American Gas-light Journal* "pitches into" the "new oxygen gas-light" in this wise:—"The writer is now writing, at the silent hour of 4 A.M. (an hour he much affects), on a marble table, surrounded by a crowd of the comfortable things which accumulate in American homes. Looking around, it seems that these are almost all composed chiefly of carbon and hydrogen. In an adjoining apartment lie asleep the fellow-beings for whom he lives and strives. In a grate beside him burns a 'sea-coal fire,' such as Mrs. Quickly never saw; being, not to put too fine a point on it, a glorious blaze of Ohio Cannel, not yet so familiar to our citizens as it is bound to be. The *light* he writes by, while sitting under a handsome 'gasalier,' is unmitigated petroleum. This is for the sake of the eyes, of course. Around him is a confined space of the atmosphere, which keeps up that process of combustion or destruction that gives us our feeble and precarious tenure of life. Before the time of Father Adam, *his* Father had been conducting a chemical process in and on his laboratory, the earth, which resulted in the establishment of the said atmosphere, exactly calculated, both quantitatively and qualitatively, for the race of Adam. Would I have the proportion of oxygen in the atmosphere of this room either increase or diminish? Diminution everybody knows the effect of; who has been down in a diving-bell, for example? In point of fact, everybody who has attended a course of chemical lectures should know the result of an increase.

"Suppose that the pipes which drop through the ceiling over the writer's head were filled with oxygen, under some pressure. Suppose (which is *quite* supposable) these pipes were not immaculate. It follows that this gas, which, according to the *Times*, 'is entirely clean and without smell,' would add to the already normal proportion in the air of the room. Some strange phenomena would already have begun to manifest themselves. Instead of my petroleum alone burning, the lamp itself would take fire. The iron grate itself would be kindled by my cannel coal. Observing these things, I should, unless I had already myself caught fire, throw open the windows, to dilute the destructive element, seek for my fire-escape, and strive to save all the *lives* yet left.

"Suppose, further, that the writer himself should venture to *sleep*, with such possibilities around him. But enough has been said. It seems to us that *gasoline* and *benzine* may 'go under.' Oxygen is doubtless a life-preserver, but it is none the less a deadly destroyer; and the proportion we already have about us was established with wisdom to which we can add nothing."

American Inventions Abroad.

Magnetic Binnacle for counteracting the effects of local attraction on Ships' Compasses.—J. Low, Boston, Mass.—A binnacle for iron ships or vessels, whereby the disturbance of the compasses in such vessels by local attraction is effectually counteracted, being constructed to receive two compasses, between which is an adjustable platform, whereon a magnet is placed, properly adjusted to counteract the local attractions.

Double Cranks.—E. Quinn, Brooklyn, N. Y.—Means for communicating motion to shafts by the construction of a double crank, with arms at a distance from each other of 120°; or the two wrists of the double crank to which the pitman-heads are attached have their position coincident with two of the apices of an equilateral triangle, whose center coincides with the center of the shaft. In order to construct one form of double crank, the shaft is bent or shaped to form parallel arms, from the upper ends of which extend outward and downward in opposite directions other arms in a plane perpendicular to the shaft. The outer make with the inner arms angles of 60°, turn at their ends running parallel with the shaft for a sufficient distance to admit of the connection of the pitman-heads, and bend again, running upward and inward, and join, making an angle of 123° with each other. The connecting-rods or pitmen are pivoted to a lever at about equal distances above and below its fulcrum, connected with wrists, and are about the same length.

Machinery for carding Cotton or like Material.—C. J. Goodwin, Hampden, Mass.—A mote-receiver, or such and a deflector, combined with a carding engine, and arranged between the feed-rolls and the lower top-flat, so as to intercept the motes as they are thrown upward in the space between the front board and the main card cylinder of the engine, and prevent them from being thrown upon the cylinder, or cotton, or fibrous material thereon, and carried between such cylinder and the top-flats.

Improvements in Glass-blowers' Molds.—H. Libbey, New Bedford, Mass.—To remedy the evil of the production of seams or ridges in glass articles at each point of a press or stationary mold, and impart a perfectly smooth and even surface, peculiar devices are employed:—1. A stationary bed for supporting the glass. 2. A mold made in two sections, smooth or having a series of rollers or other forming devices disposed on their inner surfaces. 3. Mechanism or means for opening and closing the mold. 4. Mechanism or means for rotating the mold or forming devices.

Looms for weaving Corsets and other Articles having Gores or Gussets.—J. Kuttner, New York City.—1. Means for taking up the irregular slack of the fabric as woven, so as to keep the goods straight at the point of weaving. 2. The shuttle is made so as to wind up the slack weft thread, and prevent the same being delivered from the bobbin except where the weaving is being performed; thereby the gores or gussets can be woven without the weft thread being left in loose loops.

Artificial Teeth.—C. H. Mack, Portland, Oregon.—This consists in providing an artificial crown with an undercut or dovetailed mortice, by which it is secured to the natural root. The nerve cavity is stopped with gold or other filling, and then at the anterior and posterior side of the filling holes are drilled into the solid dentine holes for pins with screw threads; the pins are firmly secured in the holes; the under-cut filled with a metal that will fuse at a low temperature; and, while yet soft, the crown is pressed firmly over the pins.

Applying Power to the Wheels of Traction-engines and other self-moving Machines.—W. W. Ranscom, San Francisco, Cal.—This consists in combining machinery so as to use water as a medium for transmitting power from the engines to the wheels of engines, excavators, and other self-moving machines, by connecting the engines directly to the driving-wheels, making them water-pressure engines, and using a steam-pump and accumulator reservoir for obtaining any required pressure.

APPLICATIONS FOR EXTENSIONS.

OPPONENTS of extensions must file *written* objections in the Patent Office at least 20 days before the day-of-hearing; and on that day, at noon, they must appear personally, or by proxy, at the Patent Office, and state the reasons of their opposition. All testimony—*pro* or *con*—must be taken and transmitted in accordance with the official rules, which will be furnished on application. The under-named patentees have recently petitioned for extensions (for seven years) of patents granted to them in the year 1858:—

SETH ADAMS, Newton, Mass.—*Valve-cock.*—Patented May 25, 1858; re-issued Feb. 20, 1872; testimony will close on April 23, next; last day for filing arguments and examiner's report, May 3; day-of-hearing, May 8.

JOSIAH LYMAN, Lenox, Mass.—*Protractors.*—Patented May 25, 1858; and additional improvements, May 15, 1860; testimony will close on April 23, next; last day for filing arguments and examiner's report, May 3; day-of-hearing, May 8.

CHARLES HENRY PERKINS, Providence, R. I.—*Machine for making Horseshoes.*—Patented June 1, 1858; re-issued March 3, 1863; testimony will close on April 30, next; last day for filing arguments and examiner's report, May 10; day-of-hearing, May 15.

A. M. MACK, Needham, Mass.—*Vapor Lamp.*—Patented June 22, 1858; re-issued Sept. 4, 1860; testimony will close on May 21, next; last day for filing arguments and examiner's report, May 31; day-of-hearing, June 5.

BACKUS A. BEARDSLEY, Waterville, N. Y.—*Grinding Mill.*—Patented June 29, 1858; testimony will close on May 28, next; last day for filing arguments and examiner's report, June 7; day-of-hearing, June 12.

DAVID W. SHAW and WILLIAM MEGRAW, Baltimore, Md.—*Whitewash Brush.*—Patented June 1, 1858; testimony will close on April 30, next; last day for filing arguments and examiner's report, May 10; day-of-hearing, May 15.

DAVID O. DE WOLF, Sackett's Harbor, N. Y.—*Raking Attachment to Harvesters.*—Patented June 1, 1858; testimony will close on April 30, next; last day for filing arguments and examiner's report, May 10; day-of-hearing, May 15.

ELI W. BLAKE, New Haven, Conn.—*Machine for crushing Stone.*—Patented June 15, 1858; re-issued Jan. 9, 1866; testimony will close on May 14, next; last day for filing arguments and examiner's report, May 24; day-of-hearing, May 29.

HIRAM E. WEST, Attleboro', Mass.—*Machinery for pressing Straw Bonnets and other Articles of Varying Thickness.*—Patented July 6, 1858; testimony will close on June 4, next; last day for filing arguments and examiner's report, June 14; day-of-hearing, June 19.

A. J. VANDEGRIFT, Covington, Ky.—*Grain Separator.*—Patented June 8, 1858; testimony will close on May 7, next; last day for filing arguments and examiner's report, May 17; day-of-hearing, May 22.

ENGLISH PATENT JOURNAL.

LIST OF APPLICATIONS FOR PATENTS

ON WHICH

Provisional Protections

HAVE BEEN OBTAINED IN ENGLAND BY OR FOR AMERICAN INVENTORS.

[*This list is condensed weekly from the "Journal of the British Commissioners of Patents," expressly for the* "AMERICAN ARTISAN."]

308.—FURNACE FOR SMELTING IRON, ETC.—S. W. Harris, Hudson, N. Y.—Jan. 31, 1872.

316.—APPARATUS FOR DETECTING LEAKAGE IN GAS AND WATER PIPES, ETC.—A. G. Myers, New York City.—Feb. 1, 1872.

321.—LAMP-BURNER.—A. G. Myers, New York City.—Feb. 1, 1872.

325.—MANUFACTURE OF IRON AND STEEL.—C. M. Nes, York, Pa.—Feb. 1, 1872.

339.—NAIL MACHINE.—J. Lawrence, Philadelphia, Pa.—Feb. 2, 1872.

340.—APPARATUS, ETC., FOR BURNING HYDROCARBONS.—J. K. Caldwell, Philadelphia, Pa.—Feb. 2, 1872.

344.—PROCESS AND APPARATUS FOR MANUFACTURING CARPETS, ETC.—Webster & Meserole, New York City.—Feb. 2, 1872.

345.—WOOD PAVEMENT.—B. B. Hotchkiss, New York City.—Feb. 2, 1872.

346.—PACKING PAVING BLOCKS, ETC.—B. B. Hotchkiss, New York City.—Feb. 2, 1872.

373.—MANUFACTURE OF SHEET-IRON.—B. Morison, Philadelphia, Pa.—Feb. 5, 1872.

401.—SEWING-MACHINES.—Howe Machine Company, Bridgeport, Conn.—Feb. 7, 1872.

405.—COMBINING MINERAL SUBSTANCES WITH VEGETABLE SUBSTANCES.—A. Hitchcock, New York City.—Feb. 7, 1872.

414.—MANUFACTURE OF METALLIC KNITTED FABRICS, ETC.—William Edge, Newark, N. J.—Feb. 8, 1872.

432.—GAS ENGINE.—G. B. Brayton, Boston, Mass.—Feb. 10, 1872.

444.—METALLIC CANS, ETC.—H. W. Shepard and R. Seaman, New York City.—Feb. 12, 1872.

How to make a Checker-board.

FOR a board, procure a stout sheet of glass, say fifteen inches square, clean the edges with a piece of stone, so that the fingers may not be cut, well clean the glass, lay it flat on a table, mark a line one and a half inches from the edge on each of the four sides, by that means you have a square inside of twelve inches, which, if divided into one and a half-inch squares, will give sixty-four squares, the number required for a chess-board. When the outside lines are drawn, draw seven lines from top to bottom; when dry, draw the seven cross lines; use a rule in setting out the lines or squares, or one square will be larger than another. When the cross lines are finished, fill in the squares. Black and bright yellow have a very good effect. Let the lines dry before filling in. Fill in the black lines first, working left to right; start in the left-hand corner; when quite dry, fill in the yellow. Let the outside line be a different color from the squares, say blue or any color to suit the fancy. When the glass chess-board is finished and put in a frame, with a drawer beneath, it has a very neat and handsome appearance.—*Cabinet Maker*.

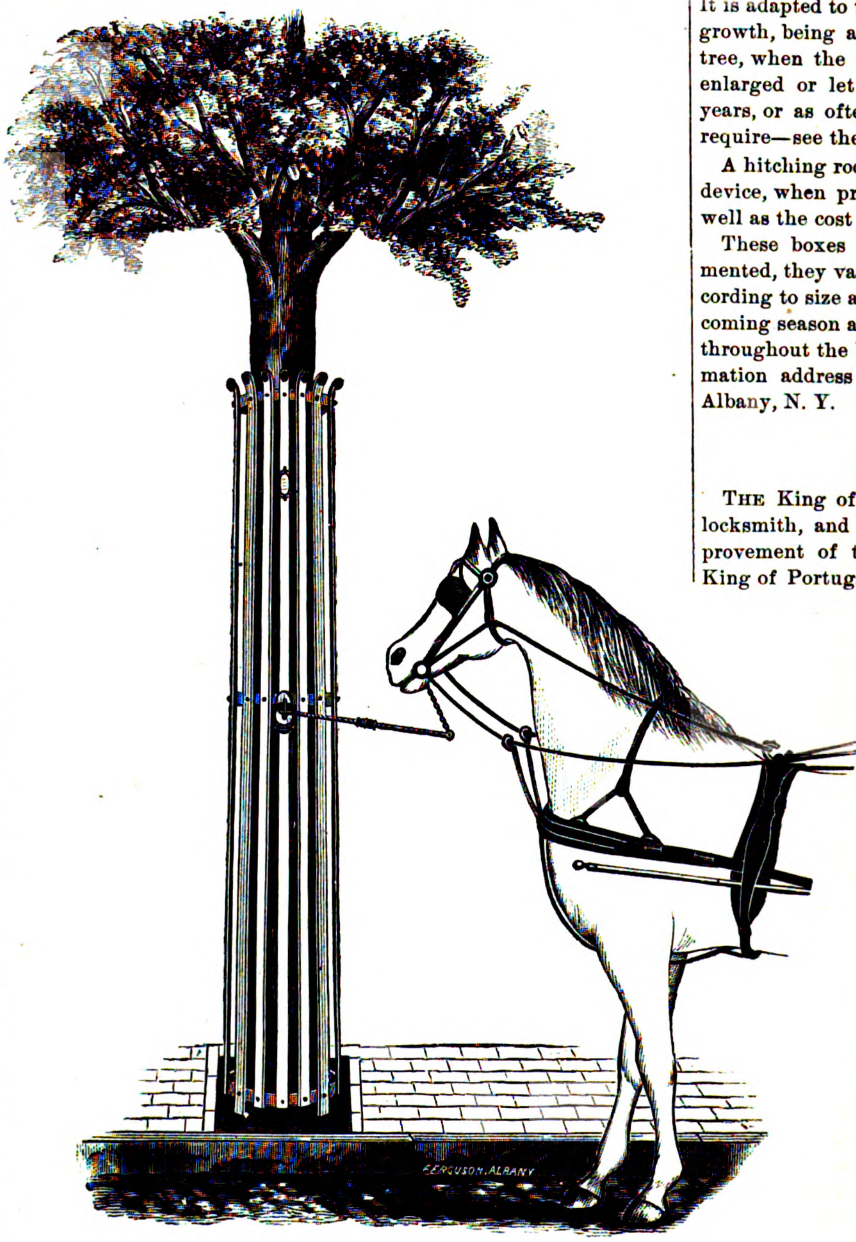
Welding Copper.

THE following is recommended as an efficient mixture to be used in welding copper. Three hundred and fifty parts of phosphate of soda are mingled with one hundred and twenty-four parts of boracic acid. The powder should be applied when the metal is at a dull-red heat; it is then brought to cherry-red and at once hammered. Owing to the tendency of the metal to soften after exposure to a high heat, a wooden hammer is recommended, which is to be used with very moderate force at first. All carbonaceous matter must be carefully removed from the pieces to be joined, since the principle of the operation depends on the formation of a very fusible phosphate of copper, which would be reduced by carbon to the condition of phosphide. The action of the substance depends on the ability of the phosphate of copper to dissolve the thin film of oxyd on the surfaces of the metal, thus keeping them perfectly clean, and consequently in good welding condition.

INGENIOUS CONTRIVANCE.—A contrivance has been placed in engine-house No. 7, Jersey City, by which the hammer attached to the bell, on first rising to strike the alarm of fire, unfastens the horses in all the stalls, and turns on the gas throughout the building. The horses have been trained so that, upon the unloosening of their halters, they immediately leave their stalls, and take their position at the engine.

Gibson's Patent Expanding Tree-box.

THE now generally prevailing custom of planting shade-trees in cities should be commended and encouraged, for trees not only add very much to the pleasant aspect of a street, but also afford refreshing shade to pedestrians during the summer's heat. The absolute necessity, in cities, for protecting the shade-trees from injury until the tree has attained a considerable growth, is, of course, very evident. It is, indeed, somewhat a matter of surprise that so many trees "still live," enduring for many years the accidental bruising resulting from the travel around them.



GIBSON'S PATENT EXPANDING TREE-BOX.

Fig. 2.

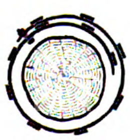
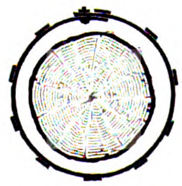


Fig. 3.



In setting out shade-trees in cities, the custom has usually been to order from a carpenter wooden tree-boxes, generally involving considerable delay, during which the trees may be seriously injured, and also causing no small expense, provided the tree-boxes are made with any degree of taste or finish. As a rule, these wooden boxes are not proportioned to the size of a young tree, and are not durable; but, should they last long enough, they are finally destroyed by the increased growth of the tree.

The illustration represents a tree-box claimed to overcome the drawbacks just indicated in these respects, viz., that it will last a long time, being made of band-iron, either painted or galvanized. It is adapted to the size of the tree at all stages of growth, being arranged to lap or fold round the tree, when the tree is small, and it can be readily enlarged or let out at intervals of three or four years, or as often as the growth of the tree may require—see the cross section, Figs. 2 and 3.

A hitching rod or chain is also attached to this device, when preferred, thus saving the room as well as the cost of an ordinary hitching-post.

These boxes are both neat and highly ornamented, they vary in price from $5 to $8 each, according to size and finish, and will be on sale the coming season at the principal agricultural stores throughout the United States. For further information address the patentee, John Gibson, Jr., Albany, N. Y.

Royal Mechanics.

THE King of Sweden is said to be an excellent locksmith, and to devote much time to the improvement of that branch of mechanics. The King of Portugal excels as a turner of wood and ivory. The members of the royal house of Hohenzollern—possibly with a view to some future contingency—have all been trained up to some useful art. The present Crown Prince is said to be an expert bookbinder, and his wife an accomplished miniature painter. The Queen of Holland is a poetess, but poetry is an inspiration and not an art. Louis Napoleon and Queen Victoria have both essayed to write books. The wife of the Prince of Wales is a superb musician, and has but few equals among amateurs as a pianist. The Czarina of Russia paints miniatures well. The Queen of Belgium is a horse trainer and a fearless rider, while the Queen of Denmark is a great housekeeper and one of the best cooks in her dominion. It is also said that some of the junior male members of the royal family of England are proficient as practical composers, while the Prince Imperial of France is a first-class typographer.

British Wool Manufacture.

THE wool manufacturing industry of England embraces 1,550 factories, 10,462 carding and 45[illegible] combing machines. They operate nearly 2,000,000 spindles and 33,792 power-looms. The number of hands employed is 100,640, of whom 53,811 are males and 46,829 females. The worsted mills number 599, running 991 carding and 848 combing machines. They work 1,900,000 spindles and 34,739 power-looms. They employ 103,514 hands, of whom 40,459 are males and 63,055 are females. The wool industry of the United Kingdom supports upward of 1,000,000 people.

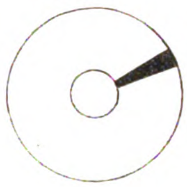
Rotary Engines.

ROTATIVE engines are those in which the energy of the steam produces the continuous rotation of a shaft through the medium of a crank and reciprocating piston. Rotary engines are those in which the continuous rotation of a shaft is caused by the action of steam on a piston or its equivalent, continuously rotating within an annulus or steam-tight casing. Reaction and impact engines—an example of the latter is furnished by Schiele's steam-fan—are also sometimes classed as rotary engines. The rotary engine is a very old invention. One was designed, for example, by James Watt. The records of the Patent Office show that at least 200 separate schemes for producing motion by the direct action of steam on a piston have been patented at one time or another. We have no intention of describing any one of these engines, but we may refer such of our readers as are interested in the subject to a very able and exhaustive review of the best of such inventions which recently appeared in the shape of a series of papers in a French technical publication, *La Propagation Industrielle*. The object we have at present in view is simply to explain the principles which should guide inventors who direct their attention to the production of efficient rotary engines, and to point out the true nature of the advantages which would attend the use of such a machine if perfectly successful.

There are very few treatises on the steam-engine in existence which do not contain an allusion to rotary engines, but the writers, one and all, take particular pains to warn inventors that nothing would be gained by the substitution of rotary for reciprocating rotative engines. This statement is perfectly true in one sense, but it is not wholly true. There is practically no loss of power as a consequence of reciprocation alone in the normal steam-engine; and it is quite certain that no economical advantages would, within well-defined limits, attend the use of rotary engines. But it can easily be demonstrated, on the other hand, that advantages could be derived from the use of a good rotary engine which would well repay the trouble, expense, and skill required to make it. The great point in favor of the rotary engine is that it will permit large measures of expansion to be used to the utmost possible advantage, simply because it places at our disposal a piston speed without any parallel in existing engines. This will become more apparent as we proceed. Strangely enough, it is a point which has hitherto been overlooked by all inventors. We propose to explain here the principal features of a theoretically perfect engine, and to point out the difficulties which present themselves when we attempt to reduce this theory to practice. It remains to be seen whether the admirable workmanship of the present day will enable these difficulties to be overcome.

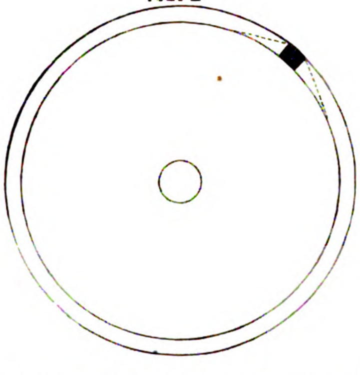
The principal feature in all rotary engines hitherto proposed consists of a piston or its equivalent rotating in a case, the piston being of a length equal or nearly equal to the radius of the circle which it describes in its revolution. The edges of this piston must be packed in some way to keep them tight. There are three edges to be packed; the fourth is made up by the shaft. But a moment's reflection is required to show that the nearer any portion of the packing is to the center, the less rapid will be its wear. The consequence is that the packing nearest the edge suffers more than that nearest the shaft, and leakage very quickly ensues. Again, the piston area in such engines is very considerable. The center of effort is not far from the shaft, and any attempt to realize a high piston speed would entail a rapidity of rotation which is inimical to the successful action of the abutment valve or its equivalent. A theoretically perfect rotary engine must have a very small piston, and the center of effort must be located as far as possible from the shaft. The two accompanying diagrams will make our meaning clear. Fig. 1 shows the old form of rotary engine; Fig. 2 shows that which we propose as being in theory infinitely superior. Let us suppose that

FIG. I



the diameter of the outer ring in Fig. 2 is 10 feet, the diameter of the inner ring 9 feet 4 inches. The piston, P, will then be 4 inches deep, and let us further suppose that it is 2 feet wide, with semicircular ends. The area of such a piston will be in round numbers 86 square inches. Let us suppose that steam of 100 lbs. pressure is cut off at one-eighth of the stroke—what a stroke means we shall explain presently—and that, deducting back pressure, the effective average pressure is 30 lbs. Then we have for the whole pressure on the piston $86 \times 30 = 2580$ lbs. Now, the circumference of a circle 9 feet 8 inches diameter—that described by the center of effort of the piston—measures 29

FIG. 2



feet 3¾ inches, or in decimals 29·3. If our engine makes sixty revolutions per minute, we shall have a piston speed of not less than 1,758 feet per minute, and $\frac{1758 \times 2580}{33,000} = 137$ H.P. Thus we have an engine occupying little more space than the fly-wheel alone of an ordinary 10-horse engine, which may nevertheless give out 140 indicated horse-power with ease. Into questions connected with the arrangements required for packing such an engine and keeping the joints tight, we shall not now enter. We are dealing at present with principles, not with details. We shall, instead, proceed to examine a most important feature, namely, the means to be adopted in providing an abutment for the steam. In very many rotary engines of the old type, a simple flat-sided sliding-valve is used as an abutment, and the consequence is a great loss of useful effort. Move this valve as quickly as we will, it is simply impossible to get it out of the way of the advancing piston and into position again behind the piston without leaving a very considerable space between the two. Even if we suppose the sliding abutment to have the same velocity as the piston, we find that it cannot in such an engine as we have described be completely closed until the piston has moved 4 inches away from it. This 4 inches represents clearance, and all clearance is waste in a rotary engine, because, unlike the reciprocating engine, there is in all rotary engines hitherto designed no compression. It is obvious that the abutment should not be withdrawn till the last moment, and that it should be replaced as quickly as possible. Suppose that the withdrawal and replacement are effected whilst the piston—including its own length—has moved over 2 feet; then as the piston is moving at the rate of, in round numbers, 30 feet per second, only the fifteenth part of a second will elapse while it is running over two feet; and it follows that a heavy mass of metal must be jerked out, brought to a dead stop, suffered to pause while the thickness of the piston is passing, and jerked in again through a distance of about 5 inches in the fifteenth part of one second; and this operation is to be repeated every second. We have no hesitation in saying that this is practically impossible.

But it is not impossible to contrive a form of abutment which shall be either a sliding-valve or its equivalent, and yet comply with the required conditions; and it is to scheming such an abutment inventors of rotary engines should direct their attention. We may throw out the hint that, by prolonging the piston backwards and forwards, and sloping it off, as shown by the dotted lines in Fig. 2, much of the clearance may be saved, and a modification of the form of the valve or abutment may also be adopted to produce like results; but in a succeeding article we shall consider this point more at length. The ordinary remedy is to provide two abutment valves, one remaining closed during half a revolution, while the other is opening and closing again; but a moment's reflection will show that this plan is only applicable to engines working absolutely without expansion, and would entail enormous waste in engines in which steam was cut off much before the end of a stroke—a stroke being represented by the travel of the piston from abutment to abutment.—*The Engineer.*

SYRUP OF COFFEE.—This preparation is of great use to those who have long journeys to make. Take half a pound of the best ground coffee; put it into a saucepan, containing three pints of water, and boil it down to one pint. Cool the liquor, put it into another saucepan, well scoured, and boil it again. As it boils, add white sugar enough to give it the consistency of syrup. Take it from the fire, and when it is cold put it into a bottle and seal. When traveling, if you wish for a cup of good coffee, you have only to put two teaspoonfuls of the syrup into an ordinary coffee-pot, and fill with boiling water. Add milk to taste, if you can get it.

COOKING WITHOUT FIRE.—At Smoky Valley, Oregon, the people have a very curious way of cooking. They do not have the trouble of making a fire every morning when they wish to get breakfast. They just walk out with their kettles, coffee-pots, and whatever else they need, and cook at the boiling spring. The water seems a great deal hotter than common boiling water, and all they need to do is to hang their kettle in it for a short time, and their feed is nicely cooked. They are able even to bake in it. The bread is put into a tight saucepan, and lowered into the boiling flood for an hour or two, and then drawn up most exquisitely baked, with but a thin rim on the crust over it. Meat is cooked here, and beans, which are the miner's great luxury. It takes but a minute to cook eggs, or to make a pot of coffee or tea; but if there should happen to be a "slip between the cup and the lip," food would be gone beyond recovery.—*Exchange.*

OFFICIAL LIST OF PATENTS

ISSUED FROM THE UNITED STATES PATENT OFFICE

For the Week ending March 5, 1872,

AND EACH BEARING THAT DATE.

Reported officially for the "American Artisan."]

PATENT CLAIMS, DRAWINGS, AND SPECIFICATIONS.—*Owing to the constantly increasing number of patents issued, we have—as we must have done sooner or later—ceased to publish the Claims, and instead thereof we publish the names of the patentees, with the titles of their inventions, with descriptions on another page of some of the more important inventions; but we are prepared to furnish immediately on application, or by return mail, when requested by letter, a copy of the claims of any existing patent, for - 75 cents.*
We also furnish a printed copy of the whole specification of any patent issued since November 20, 1866, for - - $1 25
We will also supply a sketch of the parts claimed in any patent, or a full copy of the drawing thereof, at charges varying from $1 upwards.

ADVICE TO INVENTORS AND PATENTEES.

Whenever asked, we will promptly send, gratis, our recently published pamphlet, entitled "IMPORTANT INFORMATION FOR INVENTORS AND PATENTEES," *containing details of the proceedings necessary to be taken by inventors desirous of obtaining Letters-Patent in the United States. Also, Instructions to Patentees concerning Re-issues, Extensions, Infringements, Foreign Patents, etc.*

Address BROWN, COOMBS & CO., *Solicitors of American and Foreign Patents*, 189 *Broadway, New York.*

124,192.—Composition Roofing.—Davis W. Bailey, Hingham, Mass.

124,193.—Washing Machine.—Ebenezer S. Barringer, Troy, N. Y. Ante-dated Feb. 16, 1872.

124,194.—Toy Steam-engine.—Alexander Buckman, Brooklyn, N. Y. Ante-dated Feb. 15, 1872.

124,195.—Manufacture of Window-glass.—Christian F. Carstens and Theodor H. Schwencke, Chicago, Ill.

124,196.—Manufacture of Paper-pulp.—Gustave Demailly, Argenteuil, France.

124,197.—Manufacture of Hard Sugar.—John O. Donner, Williamsburg, and Samuel S. Hepworth, Yonkers, N. Y.

124,198.—Device for cutting-off Tubes.—William H. Downing, assignor of one-half his right to Benjamin Masseth, Shamburg, Pa.

124,199.—Telegraph Insulator.—Moses G. Farmer, Salem, Mass.

124,200.—Telegraph Insulator.—Moses G. Farmer, Salem, Mass.

124,201.—Compound for insulating Telegraph-wires, etc.—Moses G. Farmer, Salem, Mass.

124,202.—Metallic Hub-bands.—Samuel D. Forbes, Wilmington, Del.

124,203.—Horseshoe.—William H. Freleigh, Troy, N. Y.

124,204.—Paint for Ships' Bottoms.—Sumner A. Gilman, Boston, Mass.

124,205.—Bed-bottom.—Samuel Gissinger, Pittsburg, Pa.

124,206.—Attachment for Sewing-machines.—Harry C. Goodrich and Frank Henry, Chicago, Ill.

124,207.—Flower-casket.—John M. Hess, Philadelphia, Pa.

124,208.—Endless-chain Horse-power.—George C. Hodge, North Danville, Vt.

124,209.—Water-elevator.—Charles Houghton, Boston, Mass.

124,210.—Railway Crossing.—William R. Hunter, Erie, Pa.

124,211.—Globe-valve.—John Johnson, assignor to himself and William A. Speaight, Brooklyn, N. Y.

124,212.—Horse-power.—Walter J. F. Liddell, Madison, Wis.

124,213.—Frame for supporting Bed-clothes.—George A. McLane, Chicago, Ill.

124,214.—Weighted Gauge-cock.—William H. McMillan, assignor to Morris, Tasker & Co., Philadelphia, Pa.

124,215.—Adjustable Horseshoe.—Henry Moran and Patrick Moran, New York City.

124,216.—Magneto-electric Battery for firing Fuses, etc.—Butler G. Noble, Brooklyn, N. Y.

124,217.—Seal-lock.—James H. Oliver, Baltimore, Md.

124,218.—Cultivator.—James H. Pattee, assignor to himself, Henry H. Pattee, and Ithamer P. Pillsbury, Monmouth, Ill.

124,219.—Smoothing-iron.—Edward B. Robinson, Portland, Maine.

124,220.—Spring for Vehicles.—Cyrus W. Saladee, St. Catharines, Canada.

124,221.—Connecting Side-springs to Vehicles.—Cyrus W. Saladee, St. Catharines, Canada.

124,222.—Folding Rule and Square.—Francis B. Scott, Lancaster, N. Y., assignor to himself and Alexander D. Penfold, New York City. Ante-dated Feb. 16, 1872.

124,223.—Casting Car-wheels.—Johann Segmüller, Pittsburg, Pa.

124,224.—Apparatus for puddling Iron.—William Sellers, Philadelphia, Pa.

124,225.—Horse Hay-rake.—Dennis P. Sharp, Ithaca, N. Y.

124,226.—Rail-chair.—Levi S. Shreffler, Elmira, N. Y.

124,227.—Car-axle Box.—Timothy B. Stewart, Hartford, Conn.

124,228.—Skate-fastening.—Robert J. Stuart, Yonkers, N. Y.

124,229.—Air-heating Furnace.—John S. Sumner, Newton, Mass.

124,230.—Machine for cutting Square Mortises.—Charles H. Thompson, assignor of one-half his right to Thomas Elwood, Cleveland, Ohio.

124,231.—Basket.—Hercy E. Tower, Worthington, Mass.

124,232.—Basket.—Hercy E. Tower, Worthington, Mass.

124,233.—Machine for jointing Staves.—David D. Tupper, Canning, Canada, assignor of one-half his right to David M. Dickie, Cornwallis, Nova Scotia.

124,234.—Washing Machine.—Eliza A. Turnbull, Springfield, Ohio.

124,235.—Sign.—Frank Walker, Windsor, Vt.

124,236.—Paper-cutting Machine.—Benjamin Weaver, assignor to George H. Sanborn, Springfield, Mass.

124,237.—Stove-platform.—William Westlake, Chicago, Ill.

124,238.—Chair, Rocker, and Lounge.—William H. Whiterow, New Albany, Ind.

124,239.—Mosquito-net.—Thomas S. Winslow, assignor to Adelia E. Winslow, New York City. Ante-dated Jan. 26, 1872.

124,240.—Railway-rail.—James A. Woodbury, Boston, Mass.

124,241.—Cultivator.—William W. Andrew, La Porte, Ind. Ante-dated Feb. 22, 1872.

124,242.—Device for lowering, raising, and fastening Sashes.—John Ashcroft, assignor to Sarah Jane Ashcroft, Brooklyn, N. Y.

124,243.—Comb-sawing Machine.—William Booth, College Point, N. Y.

124,244.—Grain-separator.—James C. Bowden, Farmington, Cal.

124,245.—Cotton-press.—Malikiah W. Bradford, Greenwood, La.

124,246.—Drawing-knife.—William Brady, Mount Joy, Pa.

124,247.—Wardrobe Clothes-drier.—Benoni S. Brown, New York City.

124,248.—Clothes-drier.—Benoni S. Brown, New York City.

124,249.—Lamp.—William Brown, Newburyport, Mass.

124,250.—Gas-retort.—John Butler, New York City.

124,251.—Car-replacer.—Peter Cartwright, New York City.

124,252.—Feeding Mechanism for Button-hole Sewing-machines.—William Chicken, Chelsea, assignor to Amos L. Wood, trustee, Boston, Mass.

124,253.—Pulley-block.—John C. Cottingham, Philadelphia, Pa.

124,254.—Bag for Phosphates, etc.—Benjamin R. Croasdale, Philadelphia, Pa.

124,255.—Spindle-step.—William C. Cross, assignor to himself and Ephraim C. Cross, Boston, Mass.

124,256.—Apparatus for Baking and Roasting.—Thomas J. T. Cummings, Fort Wayne, Ind.

124,257.—Waterproof Boot.—Ara Cushman, Auburn, Maine.

124,258.—Machine for lining Pasteboard.—George H. Dickerman, Somerville, Mass.

124,259.—Sand-paper Holder.—Norman H. Fay, Worcester, Mass.

124,260.—Table and Head-rest for Invalids.—Mary Fitch, Washington, D. C. Ante-dated Feb. 24, 1872.

124,261.—Salt-holder.—George B. Fowle, East Cambridge, Mass.

124,262.—Oscillating Swing.—John N. Fowler, New York City.

124,263.—Self-locking Blind-butt.—William R. Goodrich, Utica, N. Y.

124,264.—Lightning-rod.—Frederick O. Goodwin, assignor of one-half his right to Frank Goodwin, Philadelphia, Pa.

124,265.—Sofa-bed.—Samuel Graves, North Weymouth, Mass.

124,266.—Key for Locks.—Westel E. Hawkins, assignor to himself and Gurdon W. Hull, Wallingford, Conn.

124,267.—Paneling Machine.—Silas Heyser, assignor to James Harding and James B. Wesley, Jackson, Mich.

124,268.—Saw.—Joseph Holden, Middletown, N. Y.

124,269.—Water and Steam Valve.—Charles H. Hopkins, Lyndonville, Vt.

124,270.—Indicator Padlock.—Frederick J. Hoyt, New York City.

124,271.—Iron Shutter and Door.—John W. Hoyt, Springfield, Mass.

124,272.—Apple-parer.—Frederick W. Hudson, Leominster, Mass.

124,273.—Gate for Water-wheels.—Edward F. Hunt, Cornton, Vt.

124,274.—Car-coupling.—Aaron K. Kline, Readington, N. J.

124,275.—Ironing-Board.—George M. Lane, Battle Creek, assignor of one-half his right to Gardiner Herrick, Albion, Mich.

124,276.—Machine for making the Blanks for Sewing-machine Needles.—Thomas Lilley, Milford, Mass.

124,277.—Stopper for Bottles, Barrels, etc.—Alfred Marsh, assignor to Annie Marsh, Detroit, Mich.

124,278.—Cotton-gin.—Robert McKenna, White's Station, Tenn.

124,279.—Sink for Oil-casks.—Thomas Miller, Boston, Mass.

124,280.—Shoe-last.—William J. B. Mills, Philadelphia, Pa., assignor to Dewitt C. Taylor, trustee, New York City.

124,281.—Chair.—George W. Morstatt, New York City.

124,282.—Windmill.—William D. Nichols, Chicago, Ill.

124,283.—Windmill.—William D. Nichols, Chicago, Ill.

124,284.—Crib for Laying Foundations for Piers.—James Parish, Chicago, Ill.

124,285.—Thill-coupling.—Isaac S. Peters, assignor to two-thirds of his right to William B. Peters and Silas Peters, Marshall, Mich.

124,286.—Wire Fabric.—J. William C. Peters, Chicago, Ill.

124,287.—Portable Fare-box.—James W. Prendergast, New York City.

124,288.—Circular Hat-weaving Loom.—John Van Dusen Reed, New York City.

124,289.—Piano-forte Action.—Charles E. Rogers, assignor to himself and Albert E. Manning, Boston, Mass.

124,290.—Spindle for Spinning Machines.—Jacob H. Sawyer, Lowell, Mass.

124,291.—Top-prop for Carriages.—Anson Searls, Newark, N. J.

124,292.—Apparatus for dyeing Yarn.—Titus Sheard, Little Falls, N. Y.

124,293.—Sewing-machine for Leather.—George V. Sheffield, New York City, assignor to himself and Godfrey K. Mellor, Woonsocket, R. I.

124,294.—Log-lifter.—Green B. Sims, Elizabeth, Ind.

124,295.—Machine for bending Printers' Leads and Rules.—Frank C. Smith, New York City, and Henry McCollum, Long Island City, N. Y.

124,296.—Broiler.—Richard Penn Smith, New York City.

124,297.—Steam Slide-valve.—Nathan P. Stevens, Hopkinton, N. H.

124,298.—Safety-loom for Harness.—Charles H. Trumbull, Marion, N. Y.

124,299.—Chignon.—Edward Ulmann, New York City.

124,300.—Corpse-preserver.—John F. Waters and Edward G. Waters, Philadelphia, Pa.

124,301.—Safety-guard for Hatchways.—Zebedee S. B. Weeks and Charles L. Kohler, New York City.

124,302.—Gig-saddle Tree.—Philip H. Wiedersum, assignor to Wiedersum Manufacturing Co., New York City.

124,303.—Gig-saddle Tree.—Philip H. Wiedersum, assignor to Wiedersum Manufacturing Co., New York City.

124,304.—Churn.—Archibald Wieting, assignor to Elizabeth Wieting, Fort Plain, N. Y.

124,305.—Corn-popper.—Moses H. Wiley, Boston, assignor to himself, J. Arthur McDuffee, Medford, and Edward D. Reeve, Boston, Mass.

124,306.—Broiler and Toaster.—Moses H. Wiley, Boston, assignor to himself, J. Arthur McDuffee, Melford, and Edward D. Reeve, Boston, Mass.

124,307.—Cotton-press.—Robert N. Wyatt, Tehula, Miss.

124,308.—Clasp for looping Skirts.—Marion R. Zerbe, New York City.

124,309.—Check-protector.—James Adair, Pittsburg, Pa.

124,310.—Car-coupling.—James H. Akin, Wyandotte City, Kan.

124,311.—Harvester-dropper.—Nicholas Allstatter and Frank Schurger, assignors of one-third of their right to Robert Allstatter, Hamilton, Ohio.

124,312.—Concrete and Tile Pavement.—Gustavus A. Aschbach, New York City.

124,313.—Plow Clevis.—William Axford, Carrolltown, Ill.

124,314.—Preparing Paper for Buildings, etc.—Cyrus B. Ayer, assignor to Israel Williams, Beloit, Wis.

124,315.—Paper-board for Buildings.—Cyrus B. Ayer, assignor to Israel Williams, Beloit, Wis.

124,316.—Cultivator.—Marion J. Barr, Centerville, Ind.

124,317.—Electric Torch for lighting Gas, etc.—William W. Batchelder, New York City.

124,318.—Safety-step for Railway-cars.—Benjamin F. Beckwith, James H. Rynerson, and Alexander N. Clark, Clayton, Ind.; said Beckwith and Clark assign their right to said Rynerson.

124,319.—Paper Box.—Ebenezer B. Beecher, Westville, Conn., and William H. Swift, Wilmington, Del., assignors to Swift and Courtney and Beecher Company, New Haven, Conn.

124,320.—Sheet-metal Screw-ring.—Lewis F. Betts, Philadelphia, Pa.

124,321.—Railway-track Cleaner.—Alexander Blakely, Fairfield, Iowa.

124,322.—Washing Machine.—Dennis S. Blue, Fremont, Ohio.

124,323.—Hame-fastener.—Everal Bradley, Farm Village, N. Y.

124,324.—Fly-brush.—Benjamin F. Brown, Catlin, Ind.

124,325.—Grate and Door of Open-grate or Parlor Stoves.—Edward Brown, Philadelphia, Pa.

124,326.—Apparatus for towing Canal-boats.—William Oliver Buchanan, Montreal, Canada.

124,327.—Apparatus for propelling Street-cars.—Henry C. Bull and Benjamin Bloomfield, New Orleans, La.

124,328.—Water-elevator.—John L. Burch, Franklin, Tenn.

124,329.—Cultivator.—John E. Byers, Butler, Pa.

124,330.—Curtain-fixture.—David Clagett, Hagerstown, Md.

124,331.—Clothes-drier.—Harry H. Clark, Cincinnati, Ohio.

124,332.—Rotary Cultivator.—George Collins, Fremont, Neb.

124,333.—Oiler for Loose Pulleys.—Edward L. Conkey, Boston, Mass.

124,334.—Fruit-gatherer.—Peter Conver, Farmington, Ill.

124,335.—Feeder for Pegging Machines.—George M. Cram, East Rindge, N. H.

124,336.—Moth-repellent Paper.—Seymour Crane, Dalton, Mass.

124,337.—Machine for sewing Boots and Shoes.—Chauncey O. Crosby, Milford, assignor to the Crosby Welted-and-turned-sole Sewing-machine Company, New Haven, Conn.

124,338.—Machine for sewing Boots and Shoes.—Chauncey O. Crosby, Milford, assignor to the Crosby Welted-and-turned-sole Sewing-machine Company, New Haven, Conn.

124,339.—Plow Clevis.—Albert A. Dailey, Wilson, N. Y.

124,340.—Lady's Hair-net.—Joseph Dalton, New York City.

124,341.—Blow-off for Steam-boilers.—Benton C. Davis and John T. Hardester, Baltimore, Md.

124,342.—Fence.—Benjamin G. Devoe and Timothy Rogers, Fredericktown, Ohio, and John C. Beals, Searsport, Maine.

124,343.—Mold for making Lamp-chimneys.—Edward Dithridge, Pittsburg, Pa.

124,344.—Construction of Wooden Buildings.—Oren C. Dodge, Brooklyn, N. Y.

124,345.—Combined Stove and Boiler.—Upton J. Duffield, assignor to William C. Duffield, Wheeling, West Va.

124,346.—Manufacture of Eyelets and Apparatus for setting the Same.—Artemas B. Edmands, Saugus, Mass.

124,347.—Portable Stove for heating Water and Cooking.—George H. Ferris, Chicago, Ill.

124,348.—Propulsion of Canal-boats.—Henry W. Frackmann, assignor to himself and Otto Albrecht, Philadelphia, Pa. Ante-dated Feb. 17, 1872.

124,349.—Hook for Wire Fences.—Andrew J. Gill, assignor to F. A. Clark, Denver, Col. Ter.

124,350.—Pattern for casting Printing-disks.—John Goldsborough, Philadelphia, Pa.

124,351.—Carding Machine.—Charles Jordan Goodwin, Indian Orchard, Springfield, assignor to himself and Edward Atkinson, Brookline, Mass.

124,352.—Paper-cutting Machine.—James Ladson Gregorie, Chicago, Ill.

124,353.—Wash-boiler.—George Hall, Morgantown, West Va.

124,354.—What-not.—David Heald, Milford, N. H.

124,355.—Compound for making Casts for Fancy Articles.—Henry Hirsch, New York City.

124,356.—Burglar-alarm.—Henry Holcroft, Media, assignor of two-thirds of his right to William A. Chadwick and James G. Kitchen, Philadelphia, Pa.

124,357.—Knitting Machine.—William H. H. Hollen, Fostoria, Pa.

124,358.—Compound for preserving Wood.—Ira Holmes, Moscow, N. Y.

124,359.—Exhaust Steam-engine and Force-pump.—John Houpt, Springtown, Pa.

124,360.—Sewing-machine.—James A. House, assignor to Wheeler & Wilson Manufacturing Company, Bridgeport, Conn.

124,361.—ATMOSPHERIC MOTIVE POWER.—William Jones, New Albany, Ind.

124,362.—BLACKSMITH'S TOOL.—John F. Kernon, Saugerties, N. Y.

124,363.—ARTIFICIAL FUEL.—Julius Kircher, New York City.

124,364.—GLASS-PRESS.—Henry J. Leasure, Wheeling, West Va.

124,365.—WHISK-BROOM.—Henry A. Lee, New York City, assignor to himself and John F. Lee, Jun., Brooklyn, N. Y.

124,366.—FRUIT-CRATE.—Joshua H. Marvil, Laurel, Del.

124,367.—CLOTHES-WRINGER.—Thomas E. McDonald, Trenton, N. J.

124,368.—APPLE CORER AND CUTTER.—Stephen Mead, Fort Branch, Ind. Ante-dated March 4, 1872.

124,369.—MILK-COOLER.—Henry Messenger, Massena, N. Y.

124,370—THREE HIGH ROLLS.—James Moore, Philadelphia, and John Fritz, Bethlehem, Pa.

124,371.—CHALK-HOLDER FOR BILLIARD-TABLES.—George W Morris, assignor of one-half his right to William L. Lovell, Minonk, Ill.

124,372.—LANTERN.—George Mortimer, Jersey City Heights, N. J.

124,373.—FEED-WATER HEATER.—Gregory M. Mullen, assignor to himself and John Coyne, Baltimore, Md.

124,374.—RUBBER ERASER.—Teile H. Müller, Yonkers, N. Y.

124,375.—EGG-BEATER.—David Munson, Indianapolis, Ind. Ante-dated Feb. 28, 1872.

124,376.—YOKE-RING ATTACHMENT FOR VEHICLE-POLES.—Adam Scott Murchison, Elmira, Ill.

124,377.—COOKING-STOVE.—David H. Nation and Ezekiel C. Little, St. Louis, Mo.

124,378.—COOLING-STAND FOR GLASSWARE.—John Oesterling, Wheeling, West Va.

124,379.—PNEUMATIC RAILWAY SIGNAL.—Joseph Olmsted, Providence, R. I.

124,380.—HOISTING APPARATUS.—Samuel K. Paden, assignor to himself, Samuel Foltz, Charles C. Sankey, and John Miller, Pulaski, Pa.

124,381.—HORSE HAY-FORK.—Samuel K. Paden, assignor to himself, Samuel Foltz, Charles C. Sankey, and John Miller, Pulaski, Pa.

124,382.—ADJUSTABLE METALLIC CORNICE-BRACKET.—Alfred T. Perkins and Nehemiah Waterman, Toledo, Ohio.

124,383.—MEAT-TENDERER.—Moses M. Pettes, Worcester, Mass.

124,384.—FRUIT-GATHERER.—Charles H. Phillips and Daniel F. Briggs, Providence, R. I.

124,385.—APPARATUS FOR LOADING LUMBER.—Joseph Sandford Preston, Winona, Minn.

124,386.—ICE-FLOOR FOR PRESERVING-HOUSES.—Thomas L. Rankin, Quenemo, Kan., assignor of one-half his right to D. W. Rockwell, Elyria, Ohio.

124,387.—RAILWAY STOCK-CAR.—Samuel W. Remer, Taunton, Mass.

124,388.—COOKING STOVE AND RANGE.—Jeremiah J. Richardson, Brooklyn, N. Y.

124,389.—LEVELING INSTRUMENT.—John Rohrer, South Bend, Ind.

124,390.—LOCK-NUT.—George P. Rose, Milwaukee, Wis.

124,391.—ENDLESS-ROPE WAY.—David R. Smith, assignor to Andrew S. Hallidie, San Francisco, Cal.

124,392.—WATER-RELIEF VALVE FOR STEAM-ENGINES.—Joel Smith, Jun., assignor to himself and Orlando M. Harper, Pittsburg, Pa.

124,393.—MACHINE FOR SEWING BOOTS AND SHOES.—Michael J. Stein, New York City.

124,394.—WASH-BOILER.—Joseph C. Tilton, Pittsburg, Pa.

124,395.—RAILWAY-SWITCH.—Thomas Turner, Clifton, Canada.

124,396.—HOUSE.—Robert B. Varden, Union Town, Md.

124,397.—EXPLOSIVE COMPOUND.—Carl W. Volney, Boston, assignor to George M. Mowbray, North Adams, Mass.

124,398.—HOSPITAL BED.—Isabella Waller, Cleveland, Ohio.

124,399.—STOP-VALVE.—James Walsh, Philadelphia, Pa.

124,400.—TURN-TABLE FOR SWING-BRIDGES.—George Walters, assignor to "Phœnix Iron Company," Phœnixville, Pa.

124,401.—CORN-STALK CUTTER.—Samuel Walters, Dallas City, Ill.

124,402.—PROCESS FOR HARDENING AND PRESERVING WOOD.—Charles G. Waterbury, New York City.

124,403.—RELIEF-VALVE FOR STEAM AIR-BRAKE CYLINDERS.—Charles Westinghouse, Jun., Pittsburg, Pa.

124,404.—STEAM-POWER AIR-BRAKE AND SIGNAL.—George Westinghouse, Jun., Pittsburg, Pa.

124,405.—STEAM AIR-BRAKE.—George Westinghouse, Jun., Pittsburg, Pa.

124,406.—FAN ATTACHMENT FOR SEWING-MACHINES.—John H. Whitney, Rochester, Minn.

124,407.—LUBRICATOR FOR STEAM-ENGINES.—Sceva E. Whitney, Canaseraga, N. Y.

124,408.—CHECK-HOOK FOR HARNESS-SADDLES.—Philip H. Wiedersum, assignor to Wiedersum Manufacturing Company, New York City.

124,409.—TOILET-BRUSH.—Alden Wilder, Hingham, Mass.

124,410.—SCRUBBER AND MOP COMBINED.—Liston B. Wilson and Isaac A. Wilson, Zanesville, Ohio.

124,411.—HORSESHOE-NAIL MACHINE.—Charles W. Woodford, Montreal, Canada.

124,412.—PORTABLE COOKING-RANGE.—Elias Young, assignor of one-half his right to William Miller, Cincinnati, Ohio.

124,413.—COMPOUND FOR FRUIT-TREES, ETC.—Joze R. Westover, Town Hill, Pa.

RE-ISSUES.

4,774.—WATER-TANK FOR RAILROADS.—John Burnham, Batavia, Ill. Patent No. 93,052, dated July 27, 1869.

4,775.—REGISTERING STEAM-GAUGE.—Elijah Clark, assignor to the United States Steam-gauge Company, Louisville, Ky. Patent No. 101,583, dated April 5, 1870.

4,776.—PISTON FOR PRINTING PRESSES.—Calvert B. Cottrell, Westerly, R. I. Patent No. 121,759, dated Dec. 12, 1871.

4,777.—MACHINE FOR CLOSING SEAMS OF METALLIC CANS.—(Div. A.)—Edward T. Covell, Brooklyn, N. Y. Patent No. 94,947, dated Sept. 21, 1869; ante-dated Sept. 10, 1869.

4,778.—MACHINE FOR CLOSING SEAMS OF METALLIC CANS.—(Div. B.)—Edward T. Covell, Brooklyn, N. Y. Patent No. 94,947, dated Sept. 21, 1869; ante-dated Sept. 10, 1869.

4,779.—STEAM-BRAKE FOR RAILROAD CARS.—Samuel N. Goodale, assignor, by mesne-assignments, to Goodale Steam Car-brake Manufacturing Co., St. Louis, Mo. Patent No. 47,943, dated May 30, 1865.

4,780.—CARRIAGE BODY AND SEAT.—Simon P. Graham, London Canada, assignor, by mesne-assignments, to Theodore Comstock, Ezra Booth, and Henry F. Booth, Columbus, Ohio. Patent No. 95,466, dated Oct. 5, 1869.

4,781.—MILK-CAN.—Almont L. Hatch, Elizabeth, and Francis L. Hatch, Newark, N. J., assignees of Philip Teets, New York City. Patent No. 32,439, dated May 28, 1861.

4,782.—HARVESTER.—L. B. Holt, Cedar Falls, Iowa, and Matthew Laflin, Chicago, Ill.; L. B. Holt assigns his interest to Matthew Laflin. Patent No. 92,723, dated July 20, 1869.

4,783.—BAKER'S OVEN.—George C. Jennison, Philadelphia, Pa., assignor to himself and John Rayney, Brooklyn, N. Y. Patent No. 22,809, dated Feb. 1, 1859.

4,784.—PRESERVING FRUITS AND OTHER PERISHABLE SUBSTANCES.—Benjamin M. Nyce, Cleveland, Ohio. Patent No. 21,977, dated Nov. 2, 1858; re-issue No. 1,068, dated Oct. 23, 1860; re-issue No. 1,960, dated May 16, 1865; re-issue No. 2,037, dated July 25, 1865.

4,785.—SEWING-MACHINE.—(Div. A.)—William Wickersham, Boston, Mass. Patent No. 9,679, dated April 19, 1853; extended seven years.

4,786.—SEWING-MACHINE.—(Div. B.)—William Wickersham, Boston, Mass. Patent No. 9,679, dated April 19, 1853; extended seven years.

4,787.—WHIP-SOCKET.—Edwin Chamberlin, Lansingburg, assignor, by mesne-assignments, to himself and John O. Merriam, Troy, N. Y. Patent No. 43,896, dated Aug. 23, 1864; re-issue No. 2,387, dated Nov. 6, 1866.

4,788.—CAR FOR CARRYING PETROLEUM.—John Clark, Canandaigua, N. Y. Patent No. 40,458, dated Nov. 3, 1863.

4,789.—REFRIGERATOR.—Francis W. Hunt, East Orange, N. J. Patent No. 103,336, dated May 24, 1870.

4,790.—POTATO-PLANTER.—Hiram J. Kent, Palmyra, N. Y. Patent No. 111,217, dated Jan. 24, 1871.

4,791.—THIMBLE-SKEIN.—Charles Paddock, Alton, Ill. Patent No. 120,092, dated Oct. 17, 1871.

4,792.—APPARATUS FOR DRYING FRUIT, VEGETABLES, ETC.—Marshall P. Smith, Baltimore, Md. Patent No. 107,417, dated Sept. 13, 1870.

4,793.—GRAIN SEPARATOR AND SCOURER.—Simeon Howes, Silver Creek, and Gardner E. Throop, Syracuse, assignors, by mesne-assignments, to themselves, Alpheus Babcock, Norman Babcock, and Carlos Ewell, Silver Creek, N. Y. Patent No. 19,637, dated March 16, 1858.

DESIGNS.

5,563.—CARPET-PATTERN.—Jonathan Crabtree, assignor to Dornan, Maybin & Co., Philadelphia, Pa.

5,564 to 5,568.—CARPET-PATTERN.—John Fisher, Enfield, assignor to Hartford Carpet Company, Hartford, Conn.

5,569 to 5,573.—OIL-CLOTH.—James Hutchison, Newark, N. J., assignor to Thos. Potter, Son & Co., Philadelphia, Pa.

5,574.—VEST-CHAIN LOCK.—Kaufmann Kaufmann, New York City.

5,575.—OIL-CLOTH, ETC.—Charles T. Meyer, Lyon's Farms, Elizabeth, N. J., assignor to Edward C. Sampson, New York City.

5,576.—OIL-CLOTH, ETC.—Charles T. Meyer and Victor E. Meyer, Lyon's Farms, Elizabeth, N. J., assignors to Edward C. Sampson, New York City.

5,577 to 5,597.—CARPET-PATTERN.—Elemir J. Ney, New York City, assignor to Hartford Carpet Company, Hartford, Conn.

5,598.—COOKING-STOVE.—Lewis Rathbone, assignor to John F. Rathbone & Co., Albany, N. Y.

5,599.—JEWELRY-BOX.—Gustav Shoenemann, New York City.

5,600 to 5,603.—CARPET-PATTERN.—John H. Smith, Enfield, assignor to Hartford Carpet Company, Hartford, Conn.

5,604 to 5,607.—CARPET-PATTERN.—George C. Wright, assignor to E. S. Higgins & Co., New York City.

5,608.—SUSPENSION EYELET.—George W. Averell, New York City.

5,609.—KNIFE-HANDLE.—Matthew Chapman, Greenfield, Mass.

5,610 to 5,618.—CARPET-PATTERN.—Otto Heinigke, New York City, assignor to Hartford Carpet Company, Hartford, Conn.

5,619 to 5,623.—CARPET-PATTERN.—Henry Horan, Newark, N. J., assignor to Hartford Carpet Company, Hartford, Conn.

5,624 to 5,630.—CARPET-PATTERN.—Levi G. Malkin, New York City, assignor to Hartford Carpet Company, Hartford, Conn.

5,631.—CARPET-PATTERN.—William Mallinson, Halifax, England, assignor to Joseph Wild & Co., New York City.

5,632.—SODA-FOUNTAIN.—George F. Meacham, Newton, assignor to James W. Tufts, Medford, Mass.

5,633.—CARPET-PATTERN.—Joseph James Patchett, Halifax, England, assignor to Joseph Wild & Co., New York City.

5,634.—BIRD-CAGE HOOK.—Adolph Wunder, assignor to Sargent & Co., New Haven, Conn.

5,635.—IRON BRACKET.—Melville D. Jones, Boston, Mass.

5,636.—CARPET-PATTERN.—Archibald McCallum, Halifax, England, assignor to Joseph Wild & Co., New York City.

5,637.—CENTER ORNAMENT FOR CEILINGS.—Gaston Protin, assignor to Hector Sinclair, New York City.

5,638.—CLOCK-CASE.—Peter B. Wight, assignor to Nicholas Müller, New York City.

TRADE-MARKS.

681 and 682.—BLEACHED LONG CLOTH.—Coffin & Altemus, Philadelphia, Pa.

683 to 687.—PHOTOGRAPH ALBUM.—William W. Harding, Philadelphia, Pa.

688.—CLOTH AND PAPER.—The Manhattan Cloth and Paper Company, New York City and Newark, N. J.

689 and 690.—SMOKING-TOBACCO.—Winfree & Loyd, Lynchburg, Va.

691.—GIN.—Adams & Taylor, Boston, Mass.

692.—WHISKY.—Adams & Taylor, Boston, Mass.

693.—GIN.—Adams & Taylor, Boston, Mass.

Letter Box

E. R. H., OF OHIO.—A saving of steam and fuel can be effected by a variable cut-off, which governs the engine by cutting off the steam at some point in the stroke of the piston without throttling. The cutting-off may, however, be performed so early in the stroke as to entail positive loss. The government experiments you refer to did not show that there was no gain in using steam expansively, but showed that an engine might so use steam expansively that it was more economical to continue full pressure throughout the stroke. To use steam expansively with the best results there must be a high boiler pressure, and the cutting-off should not take place too early in the stroke. The particular point which is best will depend upon circumstances.

B. G., OF IND.—We think that you can adapt to your purpose an apparatus designed about forty years ago for cutting disks of India-rubber into strips spirally from circumference to center. In this a "plate on the end of a rotating shaft carried the disk to be cut, while a circular knife, placed in a planer at right angles to that of the disk, and rotating at the rate of three thousand revolutions per minute, was made to advance on its axis toward the center of the disk, at a given rate, proportioned to the thickness of the fillet to be cut." A slim stream of water was played upon the cutter where it came in contact with the rubber; but with the material proposed by you this will not be necessary.

F. L., OF N. Y.—Ricinic acid is one of the natural components of castor-oil.

T. O., OF S. C.—Chocolate was first made by the natives of Mexico, from which country it was introduced into Spain as long ago as 1520. The cacao fruit, from which it is made, is something like a cucumber, containing from twenty to thirty beans. These are removed when the fruit is ripe, dried by various methods, and roasted in a device resembling a rotary coffee-roaster; they are then sifted from their husks, and pounded or pressed to a paste with sugar and a little vanilla.

L. N., OF CONN.—The use of sulphites for preventing the fermentation of cider is probably inferior to the use of sulphurous fumes or sulphurous acid gas, an old French method of stopping the fermentation at any given point.

M. R. W., OF L. I.—Your incubator has no noticeable novelty, and we hardly see that it is any better than any one of a score of similar devices brought to public notice during the past few years. There is no difficulty in hatching chickens in such apparatus, but it is difficult to raise them to maturity.

D. L., OF OHIO.—According to Ure, a mixture of 10,000 parts of water, six parts muriatic acid, and a little rennet will dissolve hard-boiled white of egg into a transparent jelly in a few hours. You may be able to use this to advantage for your purpose of dissolving coagulated albumen, etc.

B. E., OF N. H.—The only use we know of for the cores of ox horns is for furnishing the ashes of which the cupels employed in assaying gold and silver are made. This could, of course, be substituted for the bone-ash used in ordinary cupellation, but the cost is so much greater that in practice they are seldom used for operation on a large scale.

L. N., OF MASS.—We do not think that a machine has ever been devised for making fire-crackers. If you can make these explosives for sale as cheap as and similar in appearance to the Chinese, the machine ought to prove a good thing. But we advise you to confine yourself to gunpowder as the explosive, for any of the fulminates will be far too dangerous. The same remark applies with equal force to the picrate of potash mentioned by you.

E. W., OF PA.—An English patent fuel, claimed to be superior to common bituminous coal in the ratio of three to two, was made many years ago as follows:—Coal refuse broken to pea size was mixed at a temperature of 220 degrees Fahr. with about one-sixth its weight of coal-tar pitch, and compressed to the size of common bricks under a pressure of five tons.

O. R., OF CANADA.—You can calculate the size required for a gunpowder van required to carry a given weight by remembering that one cubic foot of service gunpowder weighs 56·42 pounds.

J. R., OF N. J.—Window-sash stops, composed of rubber friction-rollers, were in use many years since, and, of course, cannot now be patented except in combination with other devices. Your ideas appear to us to be new, but you will have to take out a separate patent on each separate combination of the roller, the slide, and the different adjuncts used therewith.

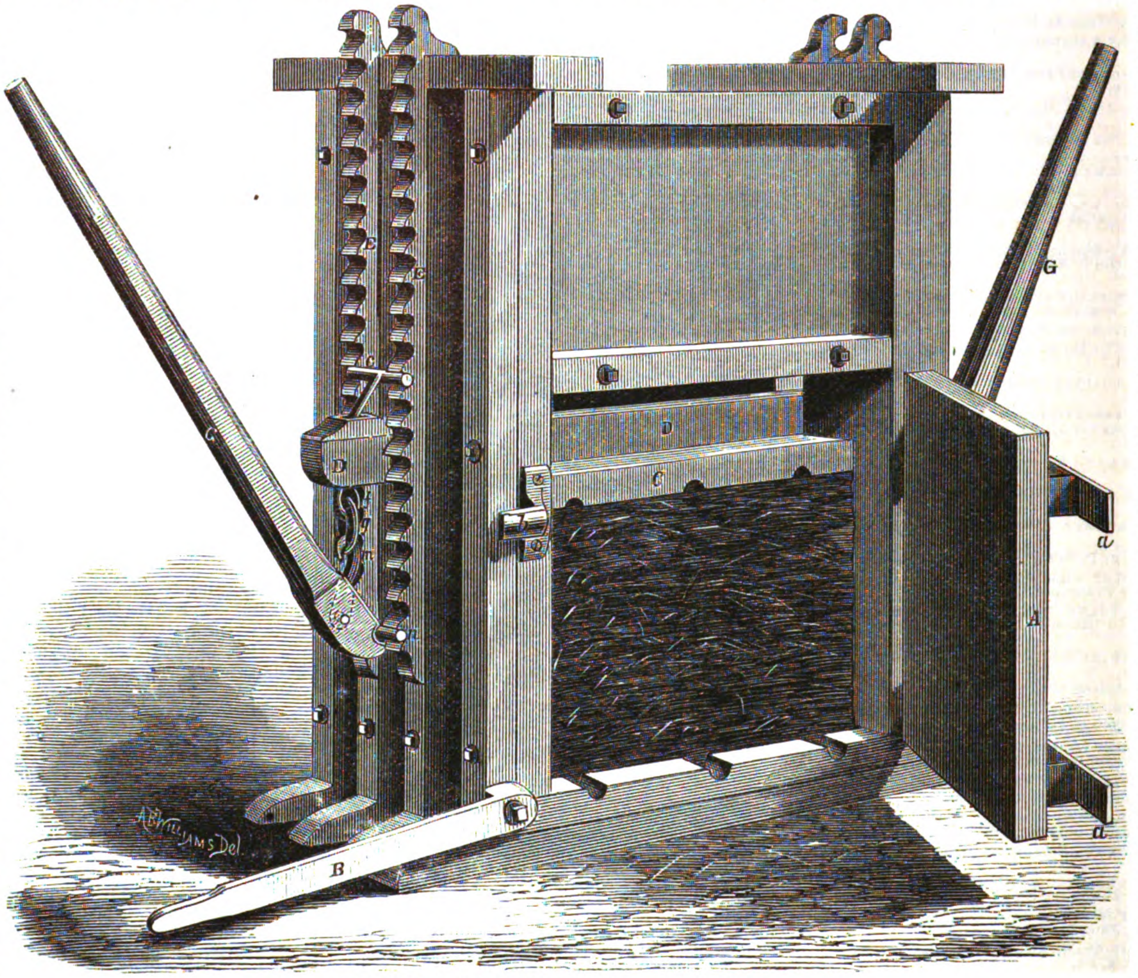
B. R. S., OF OHIO.—The artificial abrading material you mention was made by mingling coarse emery with about fifty per cent. of earth, moistening with water, compressing in a mold, and baking in a muffle. We consider your method much better, as causing less trouble and producing a superior material.

J. G., OF N. Y.—You will find a method of making phosphorescent photographs described on page 379, Vol. VI., of the AMERICAN ARTISAN.

Rock's Patent Baling Press.

ANY improvement in appliances for baling hay, hops, cotton, or other like materials, is likely to meet with widely extended favor, for the industries affected or aided by improvements of this class are obviously very great. The baling press represented in the accompanying engraving is the invention of Mr. Eugene Rock, of Greenvale, Queens Co., N. Y., by whom it was patented May 23, 1871, and who claims for it superiority over other baling apparatus in the essential matters of simplicity of construction, durability, easy manipulation, and especially the speed with which the apparatus may be worked in pressing hay, straw, and similar products. Mr. Rock is desirous of disposing of territorial rights under his patent, and calls attention to the following plain statement of the construction, operation, and merits of his improved baling press:—

The curb is of the ordinary or any suitable size and configuration, and made in the usual manner. Each side of the lower portion is furnished with the doors, A, hinged at one end and capable of being fastened shut by horizontal bars, *a*, attached to them, and having projecting ends that shut against the end of the curb in such wise that the pivoted locking-bar, B, may be brought up externally to such end and under the lug, *b*, to securely hold the doors against the internal pressure to which they are subjected during the pressing or baling operation. C is the follower, moving vertically and grooved transversely on its under side, to permit the bands to be applied in banding the bale before removal from the press, similar grooves being of course provided in the bottom of the curb. Upon and longitudinal with the follower is the beam, D, the end of which projects through vertical slots or openings formed in the ends of the curb. In each outwardly projecting extremity of this beam is provided a metallic socket which receives the fulcrum end of a pawl, *c*, the upper or swinging end of which is made broad to play into the teeth of two vertical ratchet-bars, E, arranged one on either side of the adjacent slot or opening in the end of the curb. Upon the under side of each of the just-mentioned ends of the beam is a loop, *f*, and link, *g*. Into this latter is hooked the hook, *m*, on a lever, G, the contiguous end of which is provided with lateral spurs, *n*, by which is it enabled to take into the notches of the ratchet-bars, E. These several parts at each end of the curb being in the position just described, and more plainly shown at the right-hand portion of the engraving, it is manifest that by depressing the lever, G, at each end, the beam and consequently the follower will be forced downward upon the material previously placed within the curb under the follower, and that when the end of the stroke of each lever is reached, the pawl provided thereto will catch into the teeth above of the ratchet-bars, and thereby retain the beam and follower in their depressed condition; meanwhile, the levers are again raised and their lower ends brought into lower notches in the ratchet bars, to give a new purchase to the levers for a still further depression of the follower and compression of the material beneath it. Of course, this operation is repeated until the desired degree of compression is obtained, or, in other words, the bale is reduced to the requisite size, which done, it is banded and taken out of the press in the usual manner. It will be noticed that the arrangement of the operating parts is such as to permit the follower to be run down at a quick rate of speed; that the simplicity of the press is such as to allow of its use by unskilled labor; that very little wire-work or fitting is required in adapting the working parts to each, and their cost thereby kept down to a moderate figure; and that it may be very strongly and durably made, without involving special care in its construction, thereby combining cheapness in manufacture with non-liability to injury when in active use.



ROCK'S PATENT BALING PRESS.

THERE seems to be no limit to the ingenuity of Connecticut Yankees. A farmer in that State has just contrived an infernal machine for the destruction of crows, in the shape of a kernel of corn which explodes on being picked up by the unsuspecting bird, and blows his head off without the slightest warning.

Improved Mansard Roofs.

MANSARD roofs are boards nailed on to wood rafters and covered with slate. It is such constructions that the last Legislature felt called upon to prohibit in cities by an amendment to the fire laws, that were denounced in the New York Board of Underwriters as "tinder-boxes," and that are so much dreaded by firemen. One of the latter, writing upon this subject, says: "It is evident that the slightly inclined sides of this upper story render it more liable to take fire than any of the stories below, and when once on fire its greater height from the ground makes it more difficult to put the fire out than if it were in any other part. The slate covering is not so tight but that the flames of burning buildings which adjoin pass through the interstices and set fire to the wood within, but are tight enough to prevent the fireman from driving his stream of water through to follow the flame and put it out." In spite of these and other objections that have been again and again urged against them, architects and builders still continue to yield to the popular demand, which has pronounced decidedly in favor of the Mansard and French form of roof. The objection to the faulty construction has been remedied by an ingenious and simple combination, lately devised by a prominent iron manufacturing firm in New York City. In this improvement, wrought-iron beams are substituted for wood rafters; sheet-iron, bent into dovetailed grooves, so as to hold plaster, substituted for boards, and slates are bolted or riveted upon the outside of the metal lathing thus formed, the under side of the latter being stiffened by angle or T iron and plastered to any desirable thickness, thus making a roof without a particle of combustible material in it, and one which may be called fire-proof, and at the same time is light and susceptible of any amount of ornamentation. Notable instances of this kind of work may be seen on the buildings of the Mutual Life Insurance Company, Broadway, and Continental Life Insurance Company and Fourth National Bank, Nassau Street.

CALIFORNIA produced 6,000,000 gallons of wine and 200,000 gallons of brandy in 1871. The total area in vineyard is about 40,000 acres, and the gross yield to the vineyardists is estimated at $2,700,000. The price of the wine and brandy to consumers out of the State is three times as much as the vineyardists receive.

AMERICAN ARTISAN

BROWN, COOMBS & CO., Publishers.

ISSUED WEEKLY AT

No 189 Broadway, New York.

S. T. BROWN. J. W. COOMBS.

AGENTS.

AMERICAN NEWS COMPANY..................New York City.
NEW YORK NEWS COMPANY.................. do
NEW ENGLAND NEWS COMPANY..................Boston.
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WEDNESDAY, MARCH 13, 1872

THE INSURANCE COMPANIES AND THE WATER SUPPLY.

THE officials of seventy-five leading fire insurance companies of New York and neighboring cities have published an address to the citizens of the former place concerning the control of the water supply. In this they state that there is "much scarcity of water in all parts of the city, except those not much elevated above the rivers, the supply even in the second stories being in many cases only obtained by pumping." This, it is further set forth, will, "if not remedied, before long lead to a repetition of such fires as occurred in 1835 and 1845, but on a much larger scale, as the buildings of the present time are larger and more costly, and the stocks of merchandise of immense value." The use of meters is suggested as a remedy, and a few generalizations thrown out concerning the desirability of providing some means of obviating this "dangerous state of affairs."

Whether the insurance companies have at last really awakened to the actual condition of the city as concerns liability of conflagration, or whether they have been adroitly manipulated by some one interested in a plan for providing meters wholesale to the corporation, it is of course impossible to say. But it is quite time that those professionally, as it were, interested in the preservation of buildings from fire should devote more attention to the avoidance of danger than they have hitherto done, and it would be well for them to elaborate some scheme whereby some form of cheap, durable, and efficient meter could be attached to the inlet water-pipes of buildings, large and small, without the odor of corruption that clings to almost every enterprise with which the New York city government, for years past, has had anything to do. It is by no means certain that if it were resolved to provide water-measurers to every house to-morrow, the most accurate or economical would be adopted. For months the Croton Board carried on a series of experiments to test the utility of various meters. Report says that dozens of different apparatus were thus tried, and certainly the public, who paid for these costly experiments, have a right to know the results. But none such were published, and none are accessible to the inquirer at the Department of Public Works. Until more light is let in upon the manner in which such matters are conducted, and a more satisfactory code of management comes into use, the public will hardly favor water-meters as much as the intrinsic importance of the subject demands, and inventors will not be encouraged to incur the expense of making further improvements in this class of devices.

The fire insurance companies, however, need not confine their attention to this special method of maintaining an adequate water supply, but may well advocate another plan, in which advocacy life insurance companies, if they wish to raise the average length of human life in cities, might possibly be induced to join. With the North River on one side and East River on the other, New York City has no business to be in want of water either for fire-extinguishing or sanitary purposes. Steam-power forces the whole water-supply to many of the cities in this country, and in Holland pumps the water out of the beds of lakes and away from the ditches of mighty marshes. There are half a hundred engineers in New York any one of whom could, in three months' time, elaborate a plan by which salt water could be had constantly at hand, and under control, to drench the fiercest flames of a burning square, or to sweep into the sewers the accumulated *débris* which disgraces dozens of our streets.

COAL-MINE DISASTERS.

DURING the year 1871, two hundred and seventy-two persons were killed outright in the anthracite mines of Pennsylvania, and six hundred and twenty-two others were maimed and wounded. One-third of these, it is stated on good authority, occurred because owners have, in many cases, neglected to provide more than one opening to a mine, while another third of the whole number arose from the carelessness of operatives in igniting fire-damp, the presence of which might have been previously ascertained by proper exploration with a safety-lamp. Morally, the responsibility of both classes of disaster must rest with mine-owners and managers, for experience both in this country and abroad has shown that the average miner is among the most reckless of mortals as far as concerns providing for his own safety when about his usual avocations. For some reason, legislation fails to prevent the occurrence of the yearly average of death and injury from these casualties which science pronounces capable of comparatively easy prevention. Perhaps some day the engineering profession will take up the avoidance of so-called accidents as a matter of professional pride, but, in the meantime, the roll of lives cut short by mine disasters will be likely to stretch out to a most dismal length.

CUTTING AND IRONING CLOTH.

IN many branches of manfacture it is desirable to cut cloth, leather, and other thin and flexible materials into a given form and in large numbers. In many cases, nothing is easier than to pile the sheets in successive plies one above another; clamp them firmly between two plates, and then cut them by a cutting die of suitable configuration. But such dies are costly, must be made with great accuracy, and each is only fitted to cut a single form or figure, from which no deviation can be had. A much better plan has been adopted in the Royal Clothing Factory at Pimlico, England, for shaping cloth for garments, and is capable of use in many other kinds of industry. The cloth is laid in a pile about eighty plies deep, and upon the top is chalked the pattern of the various pieces to be cut out. The whole is then brought against the sharp edge of an endless steel band, running in much the same manner as a band-saw, but with a keen cutting edge in lieu of teeth, and so the mass, as a whole, is severed as a block of wood is by the bite of a scroll-saw. Of course, when removed from the apparatus, each one of the plies or layers of cloth has the same circumferential configuration as all the rest. When the garments—sewed mainly by machine—are finished, they are ironed by sad-irons heated by gas and furnished with treadle devices by which the operator is enabled to press the iron down upon the cloth with the foot instead of by the hand. This last also seems to be an idea of considerable merit, and worthy of adoption in laundries where the mangle has not superseded the hot surface of the smoothing-iron.

CALIFORNIA PAPER MANUFACTURE.

ACCORDING to the San Francisco *Bulletin*, a new use has been found for the tules or reed-like vegetation that grows on the swamp lands of California. This plant is known to botanists as the *scirpus lacustriæ*, and is claimed to yield from fifty to sixty per cent. of paper pulp equal to that obtained from cotton. If this calculation is based upon dried material, it may be correct; but it is not possible that it can hold true with reference to the green tules any more than it would to green corn-stalks. But there seems good reason to believe that the plant is capable of profitable use in paper-making, and it is to be hoped that the arrangements said to be under way for manufacturing on a large scale will be vigorously pushed; the more so as paper, at the present time, is by no means the cheapest article of California production.

This is not for need of paper-stock, for there are doubtless many plants that, with the Pacific coast wealth of soil and climate, could be cheaply grown, but from the scarcity of clear, pure water in most localities in sufficient quantities to enable paper manufacture to be conducted on the scale which alone secures cheapness of production. Were it possible to so filter the water of the turbid rivers as to render it fit for the purpose, the chief difficulty would be removed. But to do this, Californians must avail themselves of methods that experience has not made familiar to them; and to those who care to think of a market for their improvements three thousand miles away, some of our Eastern inventors, conversant with the filtration and purification of muddy water, might do well to devise apparatus for the purpose, with especial reference to the projected paper manufacture of our American occident.

OUR STREET CARS.

THERE is no more prolific or perennial cause of grumbling than the condition of most of our city cars. For had they been contrived with express reference to the production of the greatest amount of discomfort within the smallest possible space, they would have ranked among the most successful monuments of inventive skill. They are constructed to seat twenty-four persons, and made to carry ninety. No Eighth Avenue car (and the same remark applies to most other lines) is considered fully loaded during a morning trip until each platform-step carries three passengers, and at least one agonized individual is bent over the brake-handle at the rear. As all this has involved only the wrathful objurgations of crowded sufferers, or an occasional newspaper paragraph concerning the broken limbs of somebody unable to "hold on," the companies have felt no necessity for deviating from the even tenor of their way. Now, however, the Board of Health have commenced to take cognizance of the unhealthful condition of the cars, and it is to be hoped that the owners of our city

railway lines will be obliged, if they will not consider the public comfort, to at least pay some attention to the public health.

The City Sanitary Inspector reports to the Board that the ordinary cushioned seats and backs of the cars are not and cannot be kept clean; that ventilation is inadequate; and that the straw used on the floors is a source of much offense. Now, there is no reason why any of this should exist for an hour. In some of the Brooklyn cars, the wooden seats, so cleanly, from their varnished surfaces, in summer, are simply covered with coarse carpet in winter, and it is nonsense to say that chemical or other agencies might not be used on such to give them a daily cleansing. The question of ventilation is one of more practical difficulty, but is not beyond solution, which latter would be more easy if the cars were provided with some efficient means of heating. As to the straw, its removal should be insisted upon, to the end that its place be taken by some mat-like material which would be a good non-conductor of heat, and at the same time capable of being swept at the end of each trip.

Hammered vs. Rolled Steel Rails.

We take from the *Engineering and Mining Journal* the following extract from a paper read by Mr. J. B. Pearse, at the recent meeting of the American Institute of Mining Engineers, of which the *Journal* is the official organ:—

"Rail-making begins with the Bessemer ingot, which is a block of highly crystalline metal, the tensile strength of which is low, and which contains some blow-holes or bubbles formed by the carbonic oxyd retained by the liquid steel. The inner surface of these bubbles is generally oxydized, and they are liable to be more numerous near the surface of the ingot.

"The first steel rails made ten years ago were treated like cast-steel. Until 1863, they were made from ingots 7 to 8 inches square and 4½ feet long, in four heats. In the first two heats the ingot was hammered down to size one end at a time, and swaged in dies to the shape of the first pass of the rolls. Then the bloom—by this time 8 feet long—was rolled in two heats through twelve passes into a finished rail.

"This process was excessively crude, wasting everything a steel-maker cares to save, and as the rails were found deficient and their weak points tested, it was found that the small size of the ingots and the little work done on them caused a great number of imperfect rails, and a very poor quality in the steel. At this time the expressions of want of confidence in Bessemer steel took shape. We have now, however, surmounted all difficulties, and produced a reliable uniform quality of steel, in enormous quantities considered in the light of former capabilities of production. We now use very large ingots, which necessitate thrice the work formerly applied. In 1867, the ingots were raised in England to 10 inches square, and in 1870 to 12 inches square, which is the size in general use. In America we have had exactly the English experience with small ingots, the efforts to use them to advantage having entirely failed.

"Seeing, then, that the large ingots weighing three-quarters of a tun, and making two rails, have been found necessary, it has become a question as to what mode of working them up gives the best results. I think that hammering furnishes the preferable product, and my present experience goes to justify the opinion. Rolling is preferred by some makers because it is thought cheaper, but I think the better wear of a hammered rail is a strong point in its favor. Rolled rails are generally softer than hammered rails, for the reason I have given, namely, because their carbon is apt to be partially separated as graphite, and their density is less.

"There have been, in the history of iron metallurgy, two noted contests between rolling and hammering, in one of which the hammer came off victorious, in the other the rolls. I refer to the manufacture of hammered iron and to that of armor-plates. Hammered iron is a necessity for smith-work, and the qualities imparted to it by continued piling and hammering are wonderful as compared with ordinary iron. The reputation of the Low-Moor and Yorkshire iron tires and plates is world-wide, and the steel tire had in the Low-Moor tire for some time a formidable competitor. In this case, the benefits are produced by a better texture of the iron and greater ductility developed by the work done. The cinder is thoroughly expelled in the blooming and first piling, and may be left out of the question. In the other case, the object was to get as soft and waxlike an armor-plate as was consistent with the strength necessary to resist the impact of the shot. As the work done by the shot generally used represents in foot-pounds the effect of one (gross) tun falling a mile and a half, it will readily be acknowledged that there is little similarity between the case of an armor-plate and a steel rail, which has to stand a tun weight falling only 17 feet.

"In my own experiments on the effects of the two processes, I compared ingots of the same steel, with an average area of respectively about 75 and 110 square inches, average section, as they were the only molds I had at the time to compare. I found that the rails made of blooms hammered from the ingots of the latter section stood over 100 per cent. more than the rails made direct from the ingot. The bloom was hammered to the size of the ingot and each rolled two heats, one of them a wash heat, into the same kind of rails. I tested in this way 31 different charges. Weight used was 2,000 lbs.; bearings, 2 feet apart. The rails from ingots stood 21½ feet fall of this weight, showing 1 6-10ths of an inch deflection without breaking. The rails from the blooms stood a 43-foot fall of the same weight without breaking, and showed a deflection of 3 9-10ths inches. This leaves a surplus of 50 per cent. in favor of the hammered rail, deducting 50 per cent. for amount due to difference of area of ingots. To show the connection, on a manufacturing scale, of these tests with the actual result, I would remark that we made 13,285 rails out of the ingots of 75 square inches average area. Of these there were rejected by the railroad, for insufficient strength, after delivery, 178 rails, or 1⅓ per cent. Of the larger ingots, we had made, up to the fall of 1870, 34,320 rails, and had rejected for all causes, after delivery, only 18 rails, or 1-20th of one per cent., or a quantity only 1-26th as large as before.

"We therefore continued to hammer, but now use an average section of 150 square inches; doing ⅔ the work under the hammer, and only ⅓ in the rolls. Our rails thus produced stand a tun weight falling 17½ feet, and leave an ample margin of reserved strength. We have had recent tests, in which the rail stood what was equivalent to a tun weight falling 70 feet without breaking, but have not yet got up to the armor-plate standard of a mile and a half. Out of a lot of 1,200 tuns of 58 and 60 lb. rails, not a single rail, out of the 439 tests given, broke under a tun weight falling 16½ feet. We have since had many similar series.

"The bubbles in the ingots give some trouble in the subsequent working, sometimes occasioning cracks in the ingot requiring to be chipped out. This we do as we hammer the ingot down, without hindering the hammer in its work. Rolls are apt to laminate these bubbles instead of forcibly compressing them like the hammer, and it sometimes happens that the bubble breaks out on the surface of the bloom, and causes a long streak where the metal is not sound. These streaks are especially noticeable in the head of the rail. In order to obviate the cracks resulting from these blow-holes, a hammer must be associated with the rolls to chip out bad places; and this renders the rolling process more complicated than it would appear at first sight. I do not see why it is not simpler to do all the work under one tool, namely, the hammer.

"The objections to hammering on the score of cutting sharply into the metal are not, in my opinion, of weight, as our experience agrees with the English, that you can hardly have too heavy a hammer for steel. We can strike two full blows of a 12-tun hammer on the same place without deforming or injuring the bloom in any way, or making a mark on it deeper than ⅜ inch each time. As showing what steel will stand, I will say that I have seen, in Vienna, Haswell's hydraulic press reducing ingots from 10 inches thick to 2 inches at one squeeze, without injuring the steel which was from Neuberg. It is thus surely idle to talk of a hammer as injuring steel in any way. The stroke of a heavy hammer works uniformly through the bloom, drawing the interior as much as the surface. We want to make a hard and tenacious bloom, and the concentrated blow of a heavy hammer is well adapted to that end. We lose practically nothing in ductility as compared with the rolls, and have ample room within the limits of our strength. The chemical composition controls the brittleness of our rails, and as long as we keep that right, we can make a comparatively hard rail, well adapted to wear.

"In regard to the amount produced by the two methods in the same time, the hammer compares very favorably with the rolls. A blooming mill turns out about 55 tuns of blooms a day from ingots. We do as much as that daily under a 12-tun hammer, and have done much more than that for a considerable time, so that the relative capacity of the two is hardly decided as yet. In 5 to 6 minutes we can hammer down, chip and cut in two, and carry away a large ingot, reducing it to one-third its former size; and in 35 to 40 minutes do the whole work of getting a heat of 5 ingots hammered complete into finished rail-blooms, requiring no subsequent hand-chipping. For three months this hammer did an average of about 70 tuns of rail-blooms per day, turning them out sound and well-chipped.

"As a matter of interest, it may be well to refer to the fact that at Neuberg, in Styria, they use a 19-tun hammer on steel, and, according to published statements, produce under it in a week only 65 tuns out of two furnaces in 11⅓ turns. They hope, by using four furnaces, to get up to 130 tuns a week. It shows well the spirit of American work to compare our product with this. We do now over three times as much as they hope to do, and do it under a hammer of under ⅔ the weight. The weight of ingots is about the same.

"I have explained above my reasons for preferring hammered rails, all derived from experience capable of easy verification. In practice we have found, as far as we could compare hammered with rolled rails, that the former stand the treatment they have to suffer better than the rolled rails.

From experience with rails of different making, rolled and hammered from ingots of the same size, I am enabled to say that the hammered ones have far less rejections on all accounts than the rolled ones, and that their strength against sudden jar is greater.

"I believe, therefore, that the hammered rails are superior to the rolled in very important characteristics. I do not deny that rolling may be improved so as to equal a hammered rail. That is not impossible nor improbable. It has not done it yet, in my opinion, but when it does I shall be most happy to change my opinion.

"In order to show the relative endurance of iron and steel rails, I would like to mention a case that may be regarded as furnishing an American experience of steel rails equalling that had on the English railroads, and especially on the London and Northwestern. The Philadelphia, Wilmington & Baltimore Railway laid, in their yard in Philadelphia, steel rails on one side of the track and iron rails on the other. The steel rails were hammered rails, and were, with the iron, laid in 1864. The steel rails wore out some 17 sets of the iron rails, and then the Company stopped the experiment, laying steel on both sides.

"On a curve of 525 feet radius, steel rails have lasted intact since 1865, and are as perfect as when laid, where iron rails had before only lasted from three to six months.

"None of the rails of the Pennsylvania Street Company, nor of any other company in this country, have ever been worn out by traffic or shifting work, so that I can, after a five years' experience of American makes, have reason to believe they will last at least a generation, under the hardest service."

Manufacture of Sewing-thread.

THE cotton is received into the mill in the raw state in bales. The kind best adapted for making thread is that known as the "long fiber" or Sea Island, raised along our Southern and Eastern coast; also a similar but somewhat inferior imported staple termed "Egyptian."

This cotton is taken from the bales and passed through a machine called a picker, which separates it and passes it out in a downy sheet, and rolls it up into a snowy-like bundle. From this machine it is taken to the carding machine, where it goes through another separating and refining process, and leaves this machine like a continuous untwisted rope, coiling itself round and round into a circular tin can placed to receive it. From thence it is taken to a machine called a French comber, an ingenious machine, the peculiar duty of which is to select or separate the long fibers and reject the short ones, as the long ones only (as before stated) are used in the making of thread. From this machine or comber it is passed through other machinery or processes of uniting, drawing, reducing, and partially twisting, necessary to its preparation for the spinning-frames, upon which it is finally adapted and placed.

The spinning-frames (or mules, as they are called) are self-acting, drawing out the fibers and spinning them into a very fine thread or cord (six of which are twisted together to make the thread), and wind it, when spun sufficiently, upon small bobbins or cops. The spinning-frames used in this mill are about 90 feet long, and spin about 900 threads at once. When these bobbins are full, they are taken to a winding machine, and two of these little threads are wound together upon a larger bobbin. When full, these are taken to a twisting machine, the two threads drawn off and twisted tightly together, and again wound upon cops or small bobbins. This is the first process of twisting, and the second is similar to it, except that three of these twisted threads are wound off and again twisted together, thus making the six cords required to give the strength for which this thread is celebrated.

The thread thus made is reeled off and tied up into hanks or bunches and taken to the bleachery, where it passes through the different processes of boiling, bleaching, washing, soaping, bluing, and drying; or to the dye-house, where it is boiled and prepared, and colored by various dyes, the colors being very rich, and some of them very costly, the dyeing being done by what is called the aniline process. When a number of the variously-colored spools of this thread are placed together, they present every appearance of silk.

After this process of bleaching or dyeing is completed, the hanks are again returned to the mill and wound upon large bobbins, and from these it is finally wound upon the small spools, where it remains until unwound by the busy fingers of industry throughout the world.

Before leaving this subject of thread-making, it would be as well to speak of the ingenious machines used in the final process of winding the thread upon the small spools.

These machines work automatically, or, in other words, go through all the motions necessary to wind the thread on the spool, cut the nick, insert and fasten the end of the thread, cut it off, draw off the spool and drop it into a hopper, completed and well done. It also takes up the next spool, puts it on its spindle, and goes on with its winding. All that is required is simply to feed it with empty spools and collect them when wound. These machines each wind eight spools at a time, or eight spools in a little over a minute of time, or 300 dozen per day.

These finished spools are passed through various departments, where they are labeled, assorted, and placed in neat paper-boxes, neatly labeled, or in larger quantity (assorted) in the drawers of handsome black walnut cabinet-cases.—*Manufacturers' Gazette.*

English Umbrella Manufacture.

FEW persons, we suspect, as they handle this familiar and convenient appendage to our every-day life, pause to consider the amount of ingenuity expended in its construction, or the great number of curious and skillful manipulations of which it is the result. Nearly one hundred pairs of hands have had their part in the preparation of the frame alone of this little article.

The covers were, till within sixty years, made of oiled silk, the frames of whalebone or bamboo cane. Steel was introduced about twenty years ago, the change being induced partly by the increasing cost of whalebone and partly through the great improvements accomplished in the manufacture of elastic steel.

Some idea of the universality of the use of the umbrella at the present day may be gathered from the fact that no less than 2,500,000 sets are issued in one year from the manufactory of one firm alone.

The frame, or furniture, as it is technically called, of an umbrella or parasol is composed of six parts:—1. The rib, the ends of which are named respectively the tip and the notch ends. 2. The stretcher, having the fork end and the last end. 3. The runner, which glides up or down the stick on opening or shutting the umbrella. 4. The notch or wheel, forming the apex or bottom of the umbrella, which is riveted to the stick. 5. The open cap, which fits outside the cover over the notch, and forms a finish. 6. The ferule, which is placed at the bottom of the stick and protects it when used in walking. In certain cases, which are explained below, there is also a seventh part—the stick—which is made of taper metal tube.

The wire of which the furniture is made is received into the manufactory in coiled bundles, and cut into the required lengths by a machine. Four or five gross of these lengths, now called "ribs," tightly confined within three or four iron rings, are placed in a furnace, and brought to a red-heat. When the heat has uniformly penetrated the whole bundle—care being specially taken not to oxydize the metal—it is laid on an iron plate having a number of grooves corresponding to the number of rings clasping the ribs, the rings being fixed at such intervals as to fit into the grooves. A heavy iron bar is now laid upon the ribs and kept moving backwards and forwards, causing the ribs to rotate on their own axes, thus not only straightening them by the friction, but softening the steel and preparing it for subsequent manipulations. The ribs are now taken to the "heading shop," where, by means of presses and press tools, the heads or "tips" of the ribs are made. The indentation to receive the hole for sewing on the cover is next impressed. These and a great number of other operations are carried on in separate departments or "shops," minute subdivision of labor being found essential for commercial success.* In the piercing shop the hole is punched, and the rib is completed at the "tip" end. In another shop the eye is punched at the tip end, the eye is put on a steel peg, and the notch end of the rib is formed in a pair of dies similar to those in which a needle-eye is made. The ragged or superfluous portion is now removed, and the end of the rib made smooth and round. The hole is then pierced to receive a threading wire, which forms the axis for opening and shutting the umbrella. The ribs now receive an impression in the middle, and they are sent to be hardened and tempered by the usual process of heating in a muffle, and immersion while hot in a bath of oil. They are then again confined within rings and revolved as before in the straightening operation. They are next gradually heated till the steel attains a blue color, after which every rib is tested singly, to see that the proper degree of elasticity has been obtained. This is an important consideration, and requires a very nice proportion of tempering; as, if the heat in the tempering muffle has been too high, the steel becomes too soft, while, on the other hand, if not carried far enough, the articles become brittle and useless. The rib is now ready to receive the stretcher joint, which is made as follows:—Brass wire is drawn with a groove down the center, and is cut into lengths suitable for joints; the rib is placed within the groove of one of these bits of wire, the horns of the bit are elongated to enable it in an after operation to surround the rib at the place where it has been marked to receive it, otherwise the joint would slip on the smooth surface of the rib; the rib, with the joint, is now placed between a pair of engraved dies in a press, and the pressure applied by this means is sufficient to make the joint fast as well as round and smooth all over. This is a most ingenious process, only recently perfected.

* Many machines have at various times been made and patented in different parts of Europe for the manufacture of these articles, but none have yet been found in their results to equal hand labor where subdivision has been fully carried into operation.

This joint is drilled, and the rib is complete and ready for japanning.

The stretcher is made in another part of the manufactory, as follows:—The wire in coils is placed upon a reel, drawn through rollers to straighten it, and cut into suitable lengths. One end of the stretcher is split by means of press tools about half an inch down it. In another pair of tools this split is opened by a wedge-shaped punch, which widens into the shape of the stretcher fork, descending into the die in a uniform shape. The fork in another pair of tools is then flattened on each side at one operation, and pierced so as to be attached to the stretcher-joint on the rib. The hole is now put upon a peg, and the other end of the stretcher is formed in the same way as described above in the case of the top end of the ribs.

The ribs and stretchers are now japanned, when they are taken to the riveting shop, where a large number of girls are employed in riveting them together.

In addition to the above kind of ribs and stretchers there are several others known as the Paragon, the Premier, and Hollow-ribs, which are cut out of sheet steel, and curved round until they nearly become tubes. These improved makes are considered to be both lighter and stronger, and as the extra cost is but a few pence per frame, this construction is adopted for all the best silk umbrellas. These better qualities have also enamelled tips to the ribs, which are fixed by fusion, with the aid of a blow-pipe.

Runners are made of brass and iron. They are constructed as follows:—The "blank" for the barrel is cut by circular shears into oblong pieces, knocked round on a mandrel, and soldered at the joint. A ring of metal is cast and rimered to the size of the barrel, where it is now soldered at one end, and a ring of brass at the other. They are next turned on a lathe, and a groove turned in, at the end which is afterwards to be notched to receive what is called the "threading wire," which is the axis on which the stretcher works. They are next taken to a notching machine, the exclusive invention of one firm, which, as a most important advance upon the methods hitherto in existence, demands special notice. Until this machine was invented, all notches were cut by hand, and, however skillful the workman, they were necessarily, in some measure, cut at irregular intervals. This was not of vast importance while the "gores" of the covers were also cut out by hand, but after the introduction of sewing-machines, and machines for cutting out the gores also, this irregularity became a serious difficulty, which this firm has now, by an ingenious arrangement of levers, happily surmounted, and the notches are cut with mathematical accuracy that confers upon their frames a well-merited distinction.

The runners are now smoothed at the bottom, minutely examined by the foreman, and sent to be japanned or silvered as may be required. The top-notch or wheel is made from a brass casting, turned and notched by the machine just described. The open cap is cut from a round "blank," when it is raised in dies in a stamp, three or four times successively, being stamped deeper at every operation. The bottom is punched out, taken to a lathe and turned, and afterwards subjected to a bronzing process, peculiar to this house, or, if for common caps, japanned. The ferules are also cut out of round blanks by machinery, and repeatedly drawn in presses until the required depth is obtained, being annealed and cleaned between each drawing. The bottom of each ferule is then cut out, and an iron blank inserted and soldered into its place. As this iron bottom is twice as thick as a penny, it is capable of enduring a vast amount of wear when the umbrella is used, as it is almost universally the case, as a walking-stick.

The whole of the ordinary umbrella furniture is sent away in parts, to be fitted, covered, and finished by other manufacturers. There is another class of frames, furnished with tubular metal sticks, which are fitted as complete frames before they leave the manufactory; these are particularly adapted to hot climates, which are found seriously to warp the wooden sticks.

Messrs. Cox Brothers and Holland export the furniture largely throughout Europe, to America, and to our Colonies; and there is an enormous demand for their goods within the United Kingdom. There are three principal seats of the finishing manufacture—London, for the silk and more expensive goods; Glasgow, for gingham; and Manchester, for cotton covers. In some cases the firm find it necessary to add much rich and costly ornament, and this is more especially the case for the Oriental markets, as among Asiatic nations, while not less useful, umbrellas are made more ornamental, even gorgeous, than is found suitable to our colder clime and more matter-of-fact nature.—*Mechanics' Magazine.*

Early Californian Farming Implements.

Plows were roughly fashioned from the stems of small trees, while tree-brush was the only material of which harrows were composed. Yokes for cattle were merely poles of suitable length, lashed to their horns by means of raw-hide thongs, and the only vehicles were carts, of which the wheels were sections of logs, and resembled huge cheeses with holes through the centers. Instead of chains, raw-hide ropes were used. In fact, at this period the whole business of plowing and seeding a California farm might be accomplished without the use of iron in any implement, if we except the pole or goad used for driving the cattle; for in the end of this persuader was inserted a small brad or awl.

Relating to these carts, an anecdote is told which may not be out of place here. In a certain section of California the people were greatly annoyed by marauding parties of Indians from the mountains, or wild Indians, as they were called. Now, it happened one day that an American who was riding past a grove in which was situated a ranch house, heard issuing from the thicket the most terrible and piercing screams. Hurrying with all speed to the next ranch, he informed the people what he had heard, and that he believed the place was attacked by Indians, and that they were murdering the women and children. The ranchmen bravely responded to his call, and hastily, with such arms as they could collect, hurried back with him to the place, vowing by the way vengeance upon *los piratos y roberos*—the pirates and robbers. Arriving at the place of the supposed attack, they found no robbers there, but only a couple of tame Indians engaged in the peaceful occupation of hauling fence poles with two of these carts, propelled by oxen, and as wheels and axles were composed entirely of wood, and no lubricating material used, a great screeching was the consequence.

The manner of plowing was peculiar. To every pair of oxen there were two men—Indians. The business of one was to hold the one-handled plow upright, and also to use the persuader or goad, while the other acted in the capacity of guide, marching solemnly just in front of the team. These plowmen were accustomed to wear only the boots and pants provided by Dame Nature. A *serape* (blanket with a slit in the center) and an old broad-brimmed *sombrero* (hat) completed their outfit. Sometimes the plow-holder acted as guide to those in the rear, as frequently there were five or six plows running in the same field. The furrows were mere scratches, being about four or five inches wide and three in depth.

The harvesting was accomplished in the same primitive fashion, the grain being cut with sickles and stacked in a small circular enclosure, having space between the stack and fence for a passage or roadway. Into this a band of horses were driven, two or three mounted drivers being among them, whooping and yelling like madmen. Round and round the stack went the flying band, the grain meantime being thrown on the ground for them to run over. After a few hours' exercise of this kind, the horses were turned out, the thrashed straw thrown over the fence, more of the unthrashed grain spread on the ground, the horses again turned in, again the wild, mad chase performed, and so on until the stack was finished.

The threshed grain was then imperfectly separated from the chaff and dirt by carrying it upon high scaffolds and pouring it down while the wind was blowing. This, it will be perceived, was the process practised three thousand years ago. Though poor and rude the plan, still, owing to the fertility of the soil, crops fair in quantity and quality were obtained, and the *padres, madres, señoritas, hombres,* and *Indios* (Indians)—these latter being peons and performing nearly all the labor—were enabled to luxuriate on *tortillas,* onions, beans, etc., to their hearts' content.—*San José Mercury.*

Cockle Separator.

An ingenious Tennessean has invented a novel machine for separating cockles from wheat. In it there are two cylindrical rollers, about eight inches in diameter, one of which is of iron, and the other of vulcanized rubber. The cockle, being a rough grain, imbeds itself in the rubber, and is carried over and swept off. The cockle is of as large diameter as the wheat, and it has hitherto been difficult to separate it. It poisons swine and poultry, and no use has been found for it after it is separated from the wheat.

The Flower Traffic.

Some idea of the commercial importance of the flower-growing trade may be formed when it is said that one of the large perfumers of Grasse and Paris employs, annually, 80,000 lbs. of orange flowers, 60,000 lbs. of cassia flowers, 54,000 lbs. of rose-leaves, 32,000 lbs. of jasmine blossoms, 32,000 lbs. of violets, 20,000 lbs. of tuberose, 16,000 lbs. of lilac, besides rosemary, mint, thyme, lemon, citron, and other odorous plants, in larger proportion.

Prepared Corn-cobs.—A very convenient kindling wood is made in France from corn-cobs, by immersing them in a mixture of sixty parts of melted resin and forty parts of tar; after which they are taken out and allowed to dry. They are then subjected to a second operation, which consists in spreading them out on a metallic plate heated to 212° Fahr. They are finally assorted according to size, and tied up in bundles. These are sold at the rate of three or four for a cent. The establishment in Paris for manufacturing them employs thirty workmen, and effects sales to the amount of $40,000 annually.

NEW AMERICAN PATENTS.

WE give, as follows, notices of some of the most interesting inventions for which Letters-Patent of the United States have recently been issued :—

METHOD OF MANUFACTURING STEEL-CAPPED RAILS.—J. L. Booth, Rochester, N. Y.—*Feb.* 27.—This method of making steel-capped rails consists in making the cap with thinned edges and with certain other peculiarities of shape, and bending the same around the head of the rail by passing said rail and cap, superimposed one upon the other, through properly grooved rolls, the effect of which shall be to first curl the thinned edges of the caps under and against the rail, and afterwards to compress the thick portion of the cap upon and around the head of the rail.

GASOMETER.—J. Butler, New York City.—*Feb.* 27.—The water-tank of this gasometer has an annular water-space, and is provided with a rim, lug, or projection on its inner wall, in combination with any number of projections, lugs, or bolts upon and near the lower edge of the gas-holder. The water-tank is also claimed as constructed with accessible space to induction and eduction pipes within its inner walls.

ARTIFICIAL STONE BLOCKS AND WALLS.—J. E. Dickson, Worcester, Mass.—*Feb.* 27; ante-dated *Feb.* 24.—These improved stone blocks are formed of two or more different plastic artificial stone mixtures or materials, by the use of a movable partition or partitions within suitable molds.

PURIFYING SUGAR.—H. Gerken, Middlesex County, England.—*Feb.* 27; ante-dated *Feb.* 17.—This invention includes combined processes for the purification of sugar, consisting in mixing the raw sugar with water, placing the same in a series of open trays or vessels having perforated bottoms, sprinkling the sugar with water from time to time as it becomes dry, and partially extracting the impurities therefrom by exhaustion or suction, and refining the partially purified product by the ordinary means, dissolving, filtering through charcoal, evaporating, and crystallizing.

CAR-SPRING.—A. H. King, Rahway, N. J.—*Feb.* 27.—The more noticeable feature of this improvement is found in a mass of solid vulcanized elastic india-rubber, spheroidal in form, and applied in combination with a chamber for receiving the same, the interior vertical walls of which are adjacent to the periphery of the mass when in position at the horizontal line of its axis, and a base-plate and a crown-plate, one or both of which are capable of independent movement within the chamber. There is also used the combination of two or more solid masses of elastic vulcanized india-rubber or caoutchouc, spheroidal in form, and arranged in appropriate relation with the chamber, the base-plate, and the crown-plate.

STONE-DRESSING MACHINE.—J. Lindsley, Pawtucket, R. I.—*Feb.* 27.—This apparatus comprises rotary cutters constructed in a circular head. Also, among other essential characteristics, the combination of the rotary cutters, band pulleys, and a stationary belt or band, whereby a peculiar rapid reverse motion is given to the rotary cutters while revolving at a high velocity, and during their contact with the stone.

PROPELLER.—G. R. Pierce, Grand Rapids, Mich.—*Feb.* 27.—This invention consists in a novel combination of buckets, bent shaft, and oscillating boxes, or equivalent means for connecting said shaft and buckets, so that the shaft when revolved may give a sculling motion to the buckets.

GLASS LIGHT OR PANE FOR LAMPS, LANTERNS, ETC.—B. B. Schneider, New York City.—*Feb.* 27.—This glass for lamps and lanterns is molded so as to represent on one side a series of straight vertical parallel bars or rods, the opposite side being smooth-surfaced, forming a plane or planes or curved into a circle or arc of a circle in a direction of a plane at right angles to the length of the bars.

COMPOSITION PAVEMENT.—J. R. Hayes, Philadelphia, Pa.—*Feb.* 27; ante-dated *Feb.* 17.—This composition for paving purposes is constituted by the combination of hydraulic cement with an asphaltic foundation to form pavements, pipes, and for other similar purposes. The use of marl is also claimed in combination with any hydraulic cement, and this again with any asphaltic basis.

TUYERE.—W. Werts, Camden, N. J.—*Feb.* 27; ante-dated *Feb.* 26.—The gist of this invention is found in the combination of an air-chamber with a semi-cylindrical arched covering to serve as a hearth, a valve-cylinder provided with air-passages or slots of unequal areas, and a rod or its equivalent for revolving the valve-cylinder.

HINGE.—J. Barrows, Hyde Park, Mass.—*Feb.* 27.—This is a compound hinge composed of a bracket, step-guides, and knuckles upon the post, a torsion-spring, pintle, and regulating-wheel, arranged within the knuckles.

FIRE-PLACE FENDER.—W. N. Hall, Springfield, Texas.—*Feb.* 27.—This device is constituted by a longitudinally extensible fender for fire-places, composed of two divisions, each sliding in ways of the other. The invention also includes a longitudinally extensible fender, held together by tongues to admit of longitudinal adjustment. Also, a longitudinal extensible fender supported upon andirons and secured thereto by keys.

CANAL-BOAT.—J. Hughes, New Berne, N. C.—*Feb.* 27.—This novel vessel for slack-water navigation is provided with a comb or toothed ripple-breaker surrounding the propeller-wheel, for the purpose of breaking the waves. The inventor also claims side wings and combs attached to a canal-boat, for the purpose of breaking the waves.

PAPER-TRIMMING MACHINE.—D. Pirie and A. Croom, Dundee, North Britain.—*Feb.* 27.—The more essential feature of this invention consists in a machine for trimming paper-hangings of the following elements, viz.:—A spindle adapted to swing from side to side to shift the position of the roll of paper; a pair of nipping-rollers adapted to press only upon the center of the paper, and suitable cutters for trimming the edge.

PROCESS AND APPARATUS FOR PRESERVING ANIMAL MATTERS.—A. Rock, New Orleans, La.—*Feb.* 27.—This process embraces the use of a stream of air purified by heat, and subsequently cooled and passed through liquid carbonic acid, the vapor thus created being passed into the vessel containing the meat to be preserved. There is also embraced in the invention an apparatus comprising the combination of a furnace, tubing, cooling vessel, and reservoir, with various pipes and stop-cocks, essential in carrying into practice the process specified.

SIGNAL LIGHT.—H. White, Phillipsburg, N. J.—*Feb.* 27.—This improved locomotive head-light comprises the usual reflector, an opaque shield, and colored ring, the ring being connected with the shield in such wise as to render them jointly capable of operation.

TREATING GRAIN FOR DISTILLATION AND BREWING.—A. Woolner, Louisville, Ky.—*Feb.* 27.—This method of treating grain in preparation for fermentation relates to boiling it in a closed vessel at a low temperature in a partial vacuum.

MOTH EXTERMINATOR.—Seymour Crane, Dalton, Mass.—*March* 5.—This invention consists of paper having tobacco or cedar wood, or both of them, applied to its surface in such manner as to adhere thereto. The paper thus prepared may be used as a lining under carpets or a lining for trunks or drawers, or may be laid under or between, or applied as a wrapper for, clothing, and forms a very cheap and convenient exterminator for moths, which is so effective that no moth can live in contact with or near it.

A GREAT excitement was caused in Boston recently by an alarm of fire, and half the town was out. The alarm was caused by the "boiling over of a pct of beans in a house on Conch Street." But the Boston papers say the firemen "were unable to find either the house or the beans," and consequently the city spent about $75 for nothing.

A HOLZ electric machine, one of the largest and, probably, most effective in the world, was forwarded lately to the University of Pennsylvania. The revolving-plate is 36 inches in diameter, and the machine is capable of giving an 18-inch spark, which will pierce a plate of glass 8½ inches thick.

Colossal Clock.

THE large clock at the English Parliament House is the largest one in the world. The four dials of this clock are 22 feet in diameter. Every half-minute the point of the minute-hand moves nearly 7 inches. The clock will go 8½ days, but it only strikes for 7½, thus indicating any neglect in winding it up. The mere winding up of the striking mechanism takes two hours. The pendulum is 15 feet long; the wheels are of cast-iron; the hour-bell is 8 feet high and 9 feet in diameter, weighing nearly 15 tuns, and the hammer alone weighs more than 400 pounds. This clock strikes the quarter-hours, and by its strokes the short-hand reporters in the Parliament chambers regulate their labors. At every stroke a new reporter takes the place of the old one, whilst the first retires to write out the notes he has taken during the previous fifteen minutes.

Lumber Trade of Canada.

FEW persons among us have any adequate idea of the enormous proportions of the lumber trade of the Dominion. Take for instance the trade of the valleys of the St. Lawrence and the tributary valleys. The Ottawa valleys provided during the past season 100,000,000 feet of sawn deals and 285,000,000 feet of sawn boards, and the St. Lawrence Valley provided 225,000,000 feet of sawn deals and 150,000,000 of sawn boards. In the Ottawa Valley the proposed get-out of logs was 3,200,000, and in the St. Lawrence 2,350,000. The exports for the years 1870 and 1871 show a favorable condition of affairs, and tend still further to impress one with the magnitude of the lumber interest of the Dominion.—*Quebec Paper.*

Present State of the Sutro Tunnel.

ACCORDING to the Virginia (Nevada) *Enterprise*, of Feb. 25, the Sutro Tunnel has been completed a distance of 2,751 feet, in ground which is not only very hard, but which also works very badly. Shaft No. 1 is now down 107 feet. They have not been able to do much at sinking for a few days, on accounts of the great quantity of water coming in, but they will start up their machinery on the shaft to-day. Shaft No. 2 is down 185 feet, in favorable ground, with very little water. Shaft No. 3 is down 110 feet; the ground is very hard, but no water is coming in. Shaft No. 4 is down 100 feet. The influx of water in this shaft is very strong, but suitable steam power machinery will be used to clear it.

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VOL. XIV. NEW SERIES. 1872.

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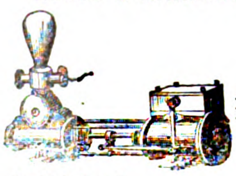

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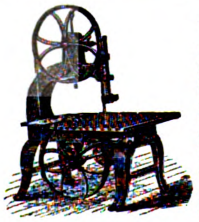

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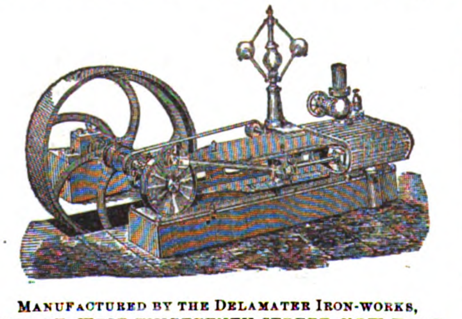

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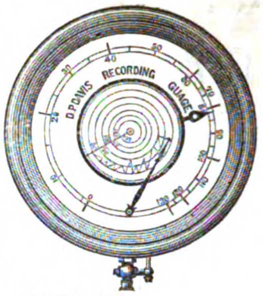

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CONTENTS OF THIS NUMBER

[Illustrations are indicated by an asterisk.]

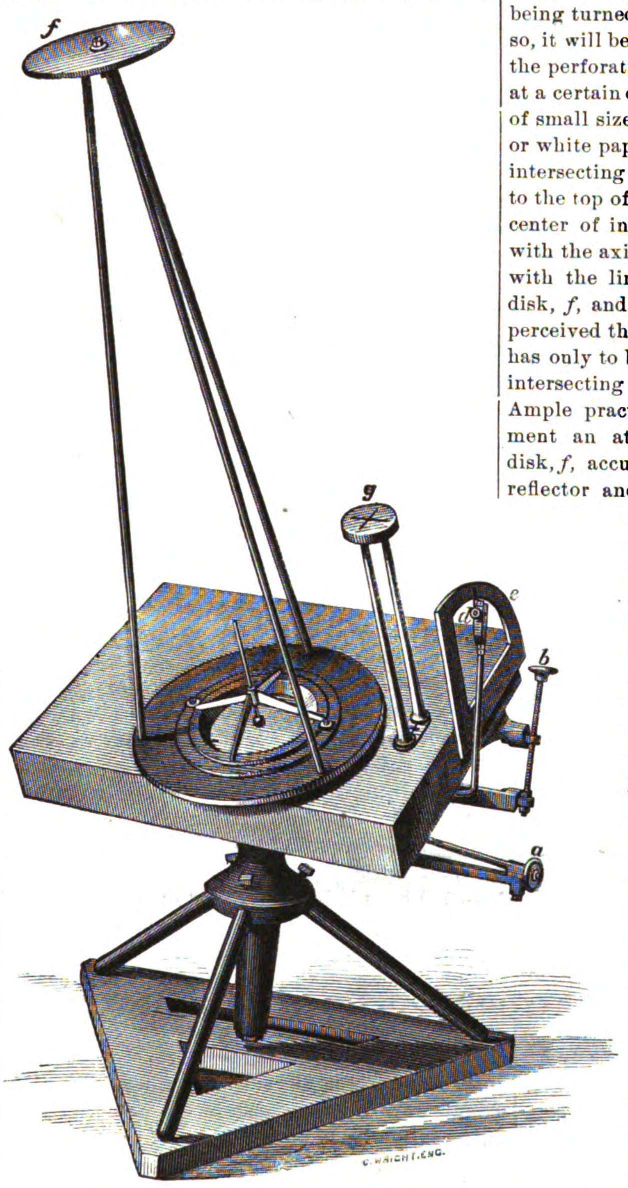
The Solar Atmosphere.

[From *Nature.*]

BY CAPTAIN JOHN ERICSSON.

THE object of the investigation discussed in *Nature* (No. 101, pp. 449–452)* being merely that of ascertaining whether the incandescent matter contained in the solar atmosphere transmits radiant heat of sufficient energy to admit of thermometric measurement, no particular statement was deemed necessary regarding the spectrum which appeared on the bulb of the focal thermometer after shutting out the rays from the photosphere during the experiments. The appearance of this spectrum has in the meantime been carefully considered. Its extent and position suggest that the depth of the solar atmosphere far exceeds the limits hitherto assumed.

The accompanying illustration represents an apparatus constructed by the writer to facilitate the investigation. Evidently, the expedient of shutting out the photosphere while examining the effect produced by the rays emanating from the chromosphere calls for means by which the sun may be kept accurately in focus during the period required to complete the observations. The main features of the apparatus being shown by the illustration, a brief description will suffice. The parabolic reflector which concentrates the rays from the chromosphere (described in the previous article) is placed in the cavity of a conical dish of cast-iron secured to the top of a table suspended on two horizontal journals, and revolving on a vertical axle. The latter, slightly taper, turns in a cast-iron socket, which is bushed with brass and supported by three legs stepped on a triangular base, resting on friction-rollers. The horizontal journals referred to turn in bearings attached to a rigid bar of wrought-iron situated under the table, firmly secured to the upper end of the vertical axle. The horizontal angular position of the table is adjusted by a screw operated by the small hand-wheel, *a*, the inclination being regulated by another screw turned by the hand-wheel, *b*. A graduated quadrant, *e*, is attached to the end of the table in order to afford means of ascertaining the sun's zenith distance at any moment. The index, *d*, which marks the degree of inclination is stationary, being secured to the rigid bar before described. The rays from the photosphere are shut out by a circular disk, *f*, composed of sheet-metal turned to exact size, and supported by three diagonal rods of steel. These rods are secured to the circumference of the conical dish by screws and adjustable nuts in such a manner that the center of the disk, *f*, may readily



be brought in a direct line with the axis of the reflector. The mechanism adopted for adjusting the position of the table by the hand-wheels, *a* and *b*, requires no explanation; but the device which enables the operator to ascertain when the axis of the reflector is pointed exactly towards the center of the sun demands particular notice. A shallow cylindrical box, *g*, provided with a flat lid and open at the bottom, excepting a narrow flange extending round the circumference, is firmly held by two columns secured to the top of the table. A convex lens of 26 inches focus is inserted in the cylindrical box, the narrow flange mentioned affording necessary support. The lid is perforated by two openings at right angles, 0·05 inch wide, 2·5 inches long, forming a cross, the lens being so adjusted that its axis passes through the central point of intersection of the cross. The fact of the table being turned at right angles to the sun, or nearly so, it will be evident that the rays passing through the perforations and through the lens will produce, at a certain distance, a brilliantly illuminated cross of small size and sharp outline. A piece of ivory, or white paper, on which parallel lines are drawn intersecting each other at right angles, is attached to the top of the table in such a position that the center of intersection of the said lines coincides with the axis of the lens. This axis being parallel with the line passing through the center of the disk, *f*, and the focus of the reflector, it will be perceived that the operator, in directing the table, has only to bring the illuminated cross within the intersecting parallel lines on the piece of ivory. Ample practice has shown that by this arrangement an attentive person can easily keep the disk, *f*, accurately in line with the focus of the reflector and the center of the sun during any desirable length of time. The absence of any perceptible motion of the column of the focal thermometer during the experiments which have been made furnishes the best evidence that the sun's rays have been effectually shut out by the intervening disk, which, it should be remembered, is only large enough to screen the aperture of the reflector from the rays projected by the photosphere. It may be noticed that actinometric observations cannot be accurately made unless the instrument is attached to a table capable of being directed in the manner described; nor is it possible to measure the dynamic energy transmitted by solar radiation unless the calorimeter employed for the purpose faces the sun with the same precision as our parabolic reflector. It is worthy of notice that the lightness of the illustrated apparatus renders exact adjustment easy, since screws of small diameter and fine pitch may be employed. It only remains to be stated that, in order to admit of accurate examination of the spectrum before referred to, the thermometer is removed during investigations which do not relate to temperature, a cylindrical stem of metal, 0·25 inch diameter, coated with lamp-black, being introduced in its place.

With reference to the result of recent experiments, it is proper to state that, at the present time, the sun's zenith distance being now nearly 60° at noon, no perceptible heating takes place in the

* See page 408, Vol. XIII., of the AMERICAN ARTISAN.

focus of the parabolic reflector. The observations relating to temperature mentioned in the previous article were made when the zenith distance was only one-third of what it is at present. The consequent increase of atmospheric depth, at this time, has completely changed the color of the spectrum, and rendered the same so feeble that its extent cannot be determined. As seen last summer, before the earth had receded far from the aphelion, the termination of the spectrum reached so far down that an addition of 0·15 inch to the radius of the disk, *f*, would scarcely have shut it out. Now an addition of 0·15 inch to the radius of the disk corresponds to an angular distance of 9′ 45″; hence, assuming the radius of the photosphere to be 426,300 miles, the depth of the solar atmosphere cannot be less than 255,000 miles. And, judging from the appearance at the period referred to, there can be little doubt that a larger and more perfect reflector will enable us to trace the spectrum still further down. Consequently, a further enlargement of the disk, *f*, will be required to extinguish wholly the reflected light from the solar atmosphere. It is reasonable, therefore, to suppose that the depth of the solar atmosphere will ultimately be found to exceed very considerably the foregoing computation.

It has been suggested regarding the instituted investigations of the radiant heat transmitted by the chromosphere that the thermo-electric pile ought to be employed in combination with the parabolic reflector. The object of the investigation being simply that of proving by the feebleness of the radiant power transmitted to the surface of the earth that the chromosphere and outer strata of the sun's envelope do not possess radiant energy of sufficient intensity to influence solar temperature, as supposed by Secchi, tests of the suggested extreme nicety are not called for.

With reference to the effect of increased depth, the small amount of retardation suffered by the rays in passing through the highly attenuated atmosphere of the sun, previously established, shows that the question of solar temperature will not be materially affected, even should it be found that the depth of the envelope is greater than the radius of the photosphere.

India-rubber Insulated Wire.

ANY facts that may at times present themselves as bearing upon the duration of india-rubber or any other insulator must be a matter of some importance to telegraphy, and, being considered in that light, should be brought as much as possible before the telegraphic world, so that some advantage might be derived from the result of such facts.

Proof is every day obtainable of the lasting properties of gutta percha insulated wire, especially in salt water, where it would appear to be imperishable. On land, however, such favorable results have not been obtained, although it cannot be doubted but that gutta-percha, properly prepared, might last on land, or underground, as long as it could be desired. With india-rubber, however, we have not had such experience, principally for the reason that it has not been used much until latterly for the purposes of cables. The manner in which wires were insulated with this material was either with "pure" rubber or with "vulcanized" rubber. The former is the plan originally adopted, the latter the plan now in use. The "vulcanized" rubber-covered wire has been used for some long lengths of cable during the last five years, but this date is too recent for the purpose of the question of durability. The vulcanized rubber used has generally been that known as "Hooper's material."

However, if we go back to a period of just twenty years, we shall find that a four-wire cable, insulated with pure rubber, was manufactured, and any experience of the present state of that cable must be of interest. Therefore, having lately seen and inspected a specimen of that cable, we place before our readers the result of that inspection, and the history of the cable itself.

In the early part of 1852, Mr. C. West manufactured 2¾ miles of cables, consisting of four wires. Each wire was of solid copper, insulated by three lappings of strips of pure india-rubber of a narrow width; the four wires were laid up helically together round a core of yarn, and were then lapped over with one stout piece of yarn, well tarred; the whole was protected with a sheathing of plaited iron wires. During the summer and autumn of 1852, this cable (2¾ miles) remained coiled up in a yard, exposed to every vicissitude of the weather, the alternation of wet and dry, sun and shade. A cable could not be situated in a worse place. It was eventually submerged or buried in the early part of 1853, between Keyhaven, on the Hampshire coast, and Hurst Castle, and a piece was laid also across the Yarmouth River. The specimen examined was taken from the Hurst Castle section, where it had been buried in thick mud, covered by the sea from half flood to half ebb. The mud in this place is always moist, and but little change is effected in it by the flow of the water over it. The insulated wire may therefore be considered to have been placed in a very favorable situation.

The specimen examined was cut out near Hurst Castle, at the end of January, 1872; it had, therefore, exactly an age of twenty years.

The appearance of the cable was as follows:—The iron sheathing was oxydized, but offering still a very strong protection; on removing the sheathing, the yarn was found to be perfect, with a large quantity of tar remaining in it. The strength and goodness of the yarn was quite as excellent as it ever had been. The insulated wires had been considerably indented by the yarn and discolored by the tar, but to all external appearance remained sound, those portions abutting against similar material, rubber against rubber, were, on being opened, in perfect preservation, and of a color apparently unchanged.

The insulation of the short lengths appeared good, for on being placed in water, and a current from 100 cells being passed into the wire, about one division was all that could be obtained on a delicate Thomson's reflecting galvanometer; on testing them, however, for retention of an electrical charge, it was found that their insulation was inferior, none of the wires were able to hold a charge for any lengthened period.

This result was not surprising, for, with the manufacture of such a cable at the date referred to, the insulation to be obtained, and the means of measuring it, were very different to what they are at the present time. Although the insulation of these wires at the present date is inferior, yet we may safely assume that it has not deteriorated since the date of manufacture.

A wire insulated in such a manner, with one strip of material placed over another, and so on, cannot be expected to give perfect insulation, for it would be impossible to make material so placed perfectly homogeneous. The means of testing at that date were necessarily, from the state of our limited knowledge and experience, very crude and imperfect, and doubtless at that time, with a large amount of battery power and the best galvanometer then obtainable, the insulation was considered perfect.

On cutting and examining the wires, it was found that there was a fair adhesion between the several lappings, and the material of each lapping had the true color of freshly cut india-rubber, retaining, at the same time, its elasticity. This may be considered as one of the principal tests of the material after a lapse of years. India-rubber as it gets old frequently dries and gets short, that is, loses all its elasticity, and may then be considered as good for little or nothing. In the present case, all the characteristics of good rubber were apparent, and its state may be said to have remained unchanged during the long time it was lying in the Hampshire mud.

The long time this cable has lasted in such perfect preservation is doubtless due to the excellent material of which it was manufactured. At that time the largest quantity of rubber imported was that known as Para, the very best kind, which has remained at the head of the list ever since its introduction. With this pure material the wires of this old cable had been covered. Since that time rubber from various parts of the world, and of various qualities, has been largely imported, and the quality of the material now used is undoubtedly inferior to that of the pure Para. The want of success attending india-rubber covered wire on land lines may owe some portion of its failure to this reason.

The stripping of the final lapping of rubber showed the copper wire perfectly clean, and with a bloom on it apparently as if it had just been manufactured. Copper wire has generally been considered dangerous to be in contact with india-rubber, and all copper wire now manufactured is invariably tinned before being covered with rubber. We believe this to be a necessary precaution when vulcanized or other than pure rubber is used, but when the rubber is pure the copper appears to be harmless.

A good many faults in india-rubber covered wires have been ascribed to the action of the copper, for it has been generally found that in the old wire the copper was always oxydized whenever the rubber had failed, or had got soft and sticky. It would appear as if the saddle had been placed upon the wrong horse, and that the oxydation of the copper was due to the failure of the india-rubber, and not the reverse, and that therefore the extra cost of tinning copper wire before covering it with pure rubber has been a useless expense. It still goes on, although one would have imagined that the appearance of the self-same kind of faults, even with the use of tinned wire, would have shown its inutility.

To tin copper wire before covering it with pure rubber we cannot but consider as a useless expense, but it is doubtless necessary when impure or vulcanized rubber is used.

It must not be imagined that the whole of the cable we have been referring to has lasted so well, or remains in such perfect condition, as the piece which has been examined with such interesting results. During the long time the cable has been laid, many faults have appeared, and in many cases the india-rubber has become soft and sticky in its common manner; but it must be remembered that these faults have always shown themselves when the wire has been exposed in dry places, in places above ground, and at wind and water marks. In such places india-rubber has usually failed. The instance we have adduced is one in which its pre-

servation is noticed when kept moist and deprived of light. This is, we believe, one of the best instances known of the preservation and duration of a wire insulated with india-rubber.—*Engineering.*

Separation of Iron Sand.

BY R. W. RAYMOND.*

THE occurrence of magnetic iron in sand is frequent and extensive in Canada, the United States, and other countries. These so-called iron sands are doubtless the result of the decomposition of rocks containing magnetic iron; and the particles of the magnetic oxyd are usually quite pure and separate from those of ordinary feldspathic or quartzose sand which surround them. Dr. Sterry Hunt has called attention to the great extent of such deposits on the St. Lawrence, and along the coast of Long Island Sound. Every attempt to utilize them as iron ore must begin with the separation of the sand. According to Prof. Egleston, the highly titaniferous iron ores are mixtures of ilmenite or menaccanite in magnetile, from which, when pulverized, the latter can be separated with the magnet. The importance of machinery for cheap and rapid separation of magnetic iron from non-magnetic associated minerals will therefore be considerable, when the utilization of the cleaned product is successfully accomplished. At Moisie, Canada, where the iron sands are worked in the blomary, a magnetic separation, employing permanent magnets, is in use.

A machine has been recently brought to my attention, a brief description of which may interest the members of the Institute. It is the invention of Mr. A. H. Balch, of Baltimore, and differs from those which I have hitherto seen in the employment of electro-magnets instead of permanent magnets. It is claimed that the facility of alternate magnetization and demagnetization, produced by making and breaking the battery circuit, gives a much stronger and more certain and controllable effect, picking up the iron particles without admixture of sand, and dropping them again when they are wanted, and cleaning the ore at a single operation.

The manner in which this is effected is quite simple. The sand is fed into a hopper, from the bottom of which it escapes through a horizontal slit (regulated in dimensions by a sliding gate), over a steeply inclined plane. It thus passes in a thin sheet, under the magnets, which do not touch it. At the bottom of this machine, and under the magnet-cylinder, are two escape openings, separated by a dividing ridge or partition, so that the sand slides directly into one of them, while the iron is lifted by the magnets, carried over the dividing ridge, and dropped into the other.

The arrangement of the magnets must be such as to secure the following conditions:—First, they must expose their polar surfaces, giving quantity rather than intensity of power; secondly, they must be magnetized when the ore is to be picked up, and demagnetized when it is to be dropped; thirdly, they must be numerous enough to make the operation continuous, one set of magnets becoming active as another set becomes inactive. These objects are secured by the following arrangement:—

The electro-magnets, surrounded with their coils of wire, are set in a cylinder, with their poles at the surface. The surface of the cylinder is made of brass or other material not conductive of magnetism. Plates of iron are secured to the ends of the magnets in such a way that the whole surface of the cylinder is embossed with iron plates, which, however, do not touch one another. The object of this is to secure a large magnetic surface, and get direct instead of induced magnetism to act on the particles of iron ore. The wire of each row of magnet coils is continuous, and is connected at one end of the cylinder with the battery, and at the other end with a spring, fastened upon the cylinder, and pressing upon a small fixed disk around which, however, it travels freely. A segment, one-seventh of the circumference of this disk, is copper, and connected with the pole of the battery opposite to that with which the magnet-wires are in permanent connection.

The rest of the disk is non-conducting (usually hard rubber). As the cylinder revolves, carrying the magnets with it, the springs at the ends of the lines travel around the disk, like a succession of delicate fingers, pressing lightly upon it. As each of these fingers comes to the copper portion of the disk, it makes connection with the battery establishing the circuit, which continues until the spring, having crossed the copper, comes again to the non-conducting circumference, when the circuit is broken. During this period, the row of electro-magnets connected with the spring is active; when the current is broken, it is demagnetized. In the small working model there are twenty-four rows of magnets in the cylinder; as one-seventh of the circumference of the disk is copper, it follows that three or four rows are always active at once, and the current from the battery is continuous, merely changing its route through the cylinder as one row after another is brought into the circuit. It need scarcely be explained that these arrangements are so adjusted as to magnetize each row as it comes opposite the sliding sheet of ferriferous sand, and to demagnetize it as it comes opposite the discharge opening for the iron ore. To prevent any iron from being carried past this point by mechanical entanglement or residual magnetism, a cylindrical brush, of small diameter, is attached, revolving in the opposite direction against the face of the cylinder.

As the magnets do not come into contact with the sand, they are not likely to polarize the iron particles, and form "nets" in the mass in which particles of common sand are mechanically entangled. By experimenting with magnets weighing one and a-half pounds, Mr. Balch has found that they will lift a stream one-eighth of an inch thick, at a distance of three-fourths of an inch. The magnets of the working model weigh a quarter of a pound each; and the quantity taken out at each separation amounts to ten per cent. of the gross weight. The battery used with this small machine was an ordinary sulphate of copper one, and would be too expensive for practice. Some form of cheap permanent battery should be employed.

The machines in which permanent magnets are used are subject (the magnets being without armatures) to the rapid loss of power. The magnets must be re-magnetized as often as once in three months. In this machine, the only inconvenience of that kind is the very slow acquisition of a slight permanent magnetism by the soft iron electro-magnets, which may require their annealing or renewal once in two or three years. . . . The importance of the machine depends, after its excellence has been established, upon the successful utilization of the material it produces. The prospect in the direction of the blast furnace is both metallurgically and economically discouraging; but there remain the blomary-fire, and the various processes proposed for the conversion of iron-sand into iron of peculiar qualities, or into steel. The only establishment now successfully treating this material, so far as I know, is at Moisie, in Canada; but experiments are continually making, from which, no doubt, some day, a satisfactory solution may be evolved.

* Read before the American Institute of Mining Engineers, at Philadelphia, Feb. 22, 1872.

NEW PUBLICATIONS.

INTERNATIONAL EXHIBITION LONDON POTTERY. Observations on the Materials and Manufacture of Terra-cotta Stoneware, Fire-brick, Porcelain, Earthenware, Brick, Majolica, and Encaustic Tiles, with remarks on the products exhibited. By Arthur Beckwith, C.E. New York: D. Van Nostrand, publisher, 23 Murray Street and 27 Warren Street, New York City. 1872.

The character and contents of this volume are sufficiently indicated by its title-page, which we have transcribed in full. The work is of much value in the special branch of art and manufacture to which it relates, and we purpose to lay before our readers some of the more popular portions of its subject-matter in the form of extracts.

A BRIEF INQUIRY INTO THE PRINCIPLES, EFFECT, AND PRESENT STATE OF THE AMERICAN PATENT SYSTEM. By H. & C. Howson. Together with the Laws of the United States relating to Patents, Trade-marks, and Copyrights. Philadelphia: Sherman & Co., printers. 1872.

The authors of this treatise state their object in its preparation to have been to collect and condense information concerning the general features of the patent law, illustrating the same, when necessary, by reference to general principles; and to afford elucidation of questions hitherto only considered in publications which, however familiar to the professional man, are not within convenient reach of the industrial public generally. The ethics of property in inventions is discussed in the opening pages, and on deductions drawn from this are based criticisms and suggestions on the present American patent system. With reference to the official examination of inventions, to determine as far as possible their novelty preliminary to the issue of patents, the writers hold that "whatever may have been the defects of the examining system, they are susceptible of remedy, and that, all defects admitted, the system may yet be regarded as one of the most efficient of those causes which have given patent property here a certainty and commercial value such as it possesses in no other patent-granting country." From this it may be inferred that the whole tenor of the work is conclusively against certain changes in the patent system now urged with no inconsiderable pertinacity in some quarters. As a carefully written digest of the more salient features of that system, upon which the industrial and, in no small degree, the commercial interests of the country have been built up, the work before us will well repay perusal.

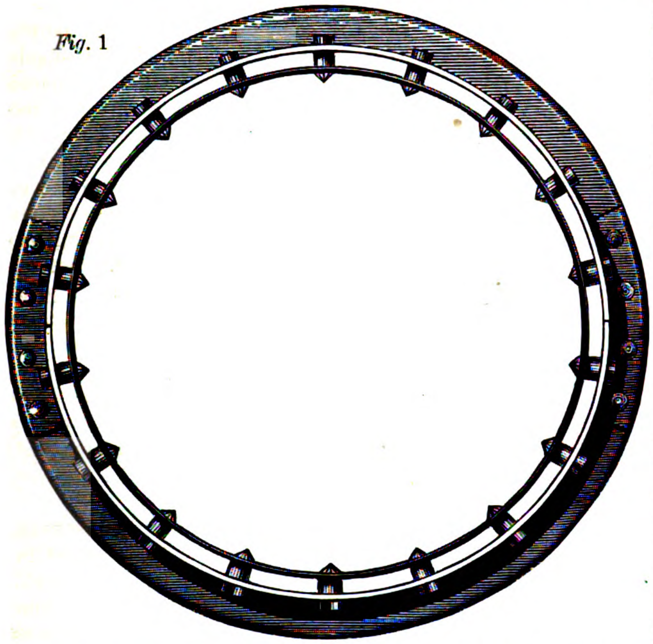
"UNCO CAREFUL."—At Chelmsford, England, the county magistrates declined to grant the use of the shire hall for a lecture on the sun, illustrated by experiments in spectrum analysis, on the ground that the electric light might endanger the safety of the building!

A GOOD LITTLE GIRL.—Little Mary Wouner, of York, Pa., discovered a broken rail in a railroad track the other day, and thereupon swung her apron to the engineer of an approaching train in so energetic a fashion that he stopped his train, and saved it from destruction.

Hooping Boiler Flues.

THERE is in Manchester, England, a "Steam Users' Association," of which Mr. Lavington E. Fletcher is chief engineer, and the proceedings of which are very often of the highest interest to all concerned in the manufacture of motors or the use of steam. In his latest monthly report, Mr. Fletcher has presented a valuable paper on hooping steam boilers, which, because of its practical character, we present, with the accompanying engravings, taken from *The Engineer*. It will be understood, of course, that the writer refers particularly to the application of encircling hoops to the furnace tubes and flues of boilers originally made without them :—

Fig. 1

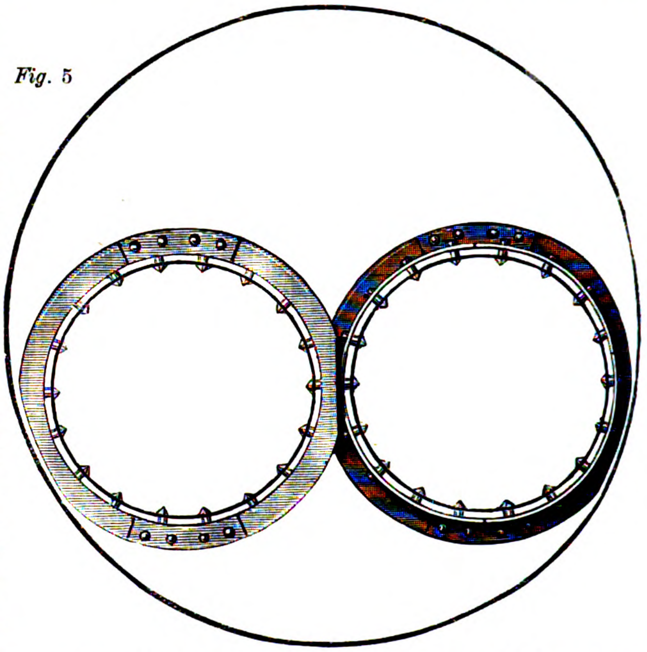


"It is very frequently found to be desirable to add encircling hoops to the furnace tubes and flues of boilers already in use, either to admit of their working pressure being increased, or to render them safe at the one to which they may have been hitherto subjected. With this view, a considerable number of encircling hoops have from time to time been added to the furnace and flue tubes of boilers belonging to members of this association. As these hoops, if not rightly applied, give rise to considerable inconvenience, instructions as to the right mode of fixing were given in the association's monthly report for June, 1862, while in addition it has been the practice to send to those members requiring it a detailed description in each case, accompanied with an explanatory sketch. This information is in such frequent request that it is thought that it would be well to make another reference to the subject in the present report, entering upon it with somewhat fuller detail, and adding illustrations.

"Fig. 1 gives a cross-section of a furnace tube with an encircling hoop attached, while Fig. 2 gives a horizontal section, and Fig. 3 an external plan view. A consultation of these sketches with the others, which will be referred to in due course, will, it is trusted, make the following description clear.

"The hoops should be of angle iron, section about 5 inches by 3 inches by ½ inch. They should be made in halves, so that they may be passed in at the manhole, and then riveted to the furnace or flue tubes in position, thus rendering it unnecessary either to remove the tubes or cut any opening in the boiler. The angle iron should not be brought into direct contact with the plates of the tube, but a clear space of not less than an inch should be left between the two; the hoop for this purpose having a diameter some 2 inches larger than the furnace-tube. The hoop should be secured to the furnace-tube by rivets spaced about 6 inches apart; blocking-pieces, through which the rivets should pass, being inserted between the tube and the angle iron so as to give a solid abutment for the riveting, while the halves of the hoop should be connected together by butt-strips, riveted to their ends at the back. Sometimes these blocking-pieces are made by cutting off a piece of bar iron, and punching a hole through it for the insertion of the rivet, and thus forming a description of rough and thick washer. This plan is very objectionable, as it forms too great a lump of metal round the rivet, and promotes the overheating of the plate. The blocking-pieces should be made of a strip of iron not more than $\frac{3}{16}$ inches thick, bent round into a circular shape, the ends being welded together so as to form a short tube or ferrule. These ferrules should be well fitted into the space between the hoop and the plating of the furnace and flue tube, while the ends of one half hoop should be firmly butted against the ends of the other half hoop, so that the whole may be tightly drawn together, as much of the support afforded by these hoops depends upon their being made one with the furnace and flue tubes, and not put in so as to act merely as separate hoops from which the plates are hung.

Fig. 5



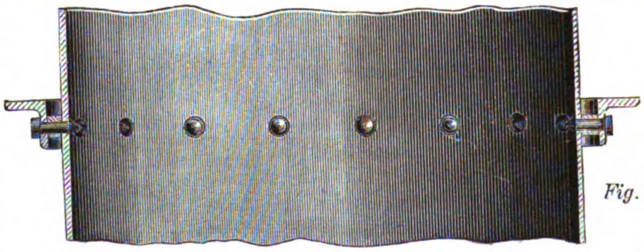


Fig. 2

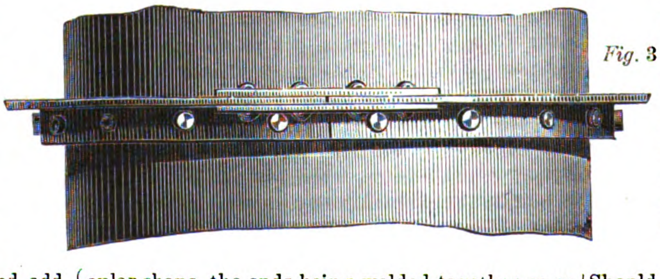


Fig. 3

"Fig. 4 gives a full-sized view of the mode recommended of attaching the angle iron hoop to the furnace and flue tube, showing the ferrules in position between the angle iron hoop and the plate, with the rivets passing through them.

"The object of allowing a water-space between the furnace-tube and the angle iron ring is to admit of the circulation of the water between the two. If the angle iron and the tube-plate be brought in direct contact one with the other, or the space be too contracted, the plate becomes overheated and cracks at the rivet-holes, in consequence of which this system of hooping has been in some cases unfairly condemned. Where, however, a suitable water-space has been left, and not allowed to become choked with deposit, no injury has been found to arise. A hoop of angle iron is preferable to one of T-iron, as the single flange of the angle iron, being narrower than the double flange of the T-iron, offers less impediment to the escape of the steam generated within the annular water-space, and also less harborage for deposit, and is therefore not so likely to keep the water from contact with the plates and to lead to their overheating. It is sometimes the practice to put two angle irons back to back. This, however, is quite unnecessary, and a single angle iron is all that is required.

"In some boilers, the water-space between the shell and the furnace-tubes, as well as between the furnace-tubes themselves, is too limited to allow of the angle iron being preserved in its entirety. In such cases, a portion of the flange of the angle iron may be cut off, which gives a cross-section of a Lancashire boiler with hoops applied to the two furnace-tubes. Should this not be sufficient to meet the difficulty, the clearance between the furnace-tube and the hoop may be contracted just at the narrowest part of the water-space, between the side of the furnace-tube and the shell of the boiler, as that point falls below the level of the fire-bars, but the water-space should never be contracted above that level. The hoops should not be allowed to touch the shell of the boiler, or the furnace-tubes may become strained and leakage be induced, since furnace and flue tubes rise and fall with variations of temperature, and thus

grind against the sides of the shell or against one another where in contact. In fixing hoops in pairs, one hoop should be set a little out of line with the other, so that the flanges may not come in contact, or be so close to one another as to form a harbor for incrustation.

"The number of hoops which it may be necessary to add to a furnace and flue-tube would have to be decided in each case as it arises, after a careful examination of the boiler, since it depends on so many conditions, viz., the pressure of steam at which the boiler is to be worked, the length and diameter of the furnace and flue tube, as well as its circularity, which has a most important influence on its strength; also, the thickness and condition of the plating at the time of applying the hoops, in addition to the proportions of the boiler, and the circumstances of the case generally.

"It is, however, recommended that in every boiler of ordinary dimensions one set of hoops should be applied to the furnace-tubes at about 5 feet from the front end. The object of placing the hoops in that position is to guard the furnace-tubes against the strain induced by the action of the fire, and also to act as a precaution in the event of the furnace-crowns becoming overheated.

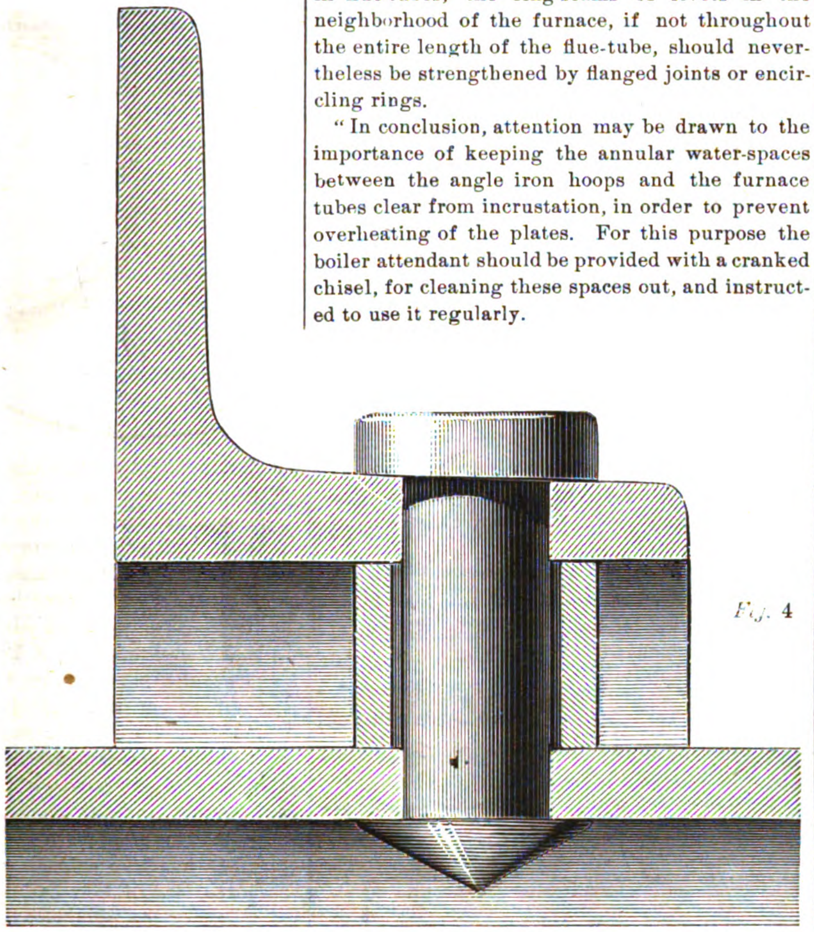


Fig. 4

"When two strengthening hoops are required to each furnace tube, it is recommended that they should be placed in such position that the first set of hoops be placed within about 5 feet from the front end, and the second midway between the first set and the back end of the boiler.

"When greater strength is required, and three sets of hoops are necessary, it is recommended that they should be spaced in such manner that the first set be placed as before, within about 5 feet from the front end of the boiler, and the other two so as to divide the remainder of the furnace-tube into three equal portions.

"Some boilers are made originally with a diaphragm plate-stay, fixed midway between the two ends of the boiler. In such cases, where three set of hoops are required, it is recommended that they be spaced so that the first pair of hoops is placed as before, at about 5 feet from the front end, the second midway between the first and the diaphragm plate-stay, and the third midway between that stay and the back end of the boiler.

"The positions given above are not absolute, but approximate, as adjustments will sometimes be required to prevent the hoops falling on the ring-seams of rivets. Wherever it is practicable, the angle iron hoops should be kept 6 inches free of the ring-seams of rivets.

"It must be clearly understood that the above recommendations refer simply to the application of angle iron hoops as afterclaps to boilers originally made without them. Angle iron hoops of the description explained above are by no means recommended for new structures, which should be strengthened either with flanged joints or hoops of T-iron, bridge-rail, or other approved section, applied to each of the ring-seams of rivets in the furnace and flue tubes, the hoops being used as covering strips for connecting the adjoining belts of plating, and being riveted directly thereto without the intervention of ferrules. Should water-pockets or water pipes be introduced in flue-tubes, the ring-seams of rivets in the neighborhood of the furnace, if not throughout the entire length of the flue-tube, should nevertheless be strengthened by flanged joints or encircling rings.

"In conclusion, attention may be drawn to the importance of keeping the annular water-spaces between the angle iron hoops and the furnace tubes clear from incrustation, in order to prevent overheating of the plates. For this purpose the boiler attendant should be provided with a cranked chisel, for cleaning these spaces out, and instructed to use it regularly.

Shifting Car-bodies.

It is stated that the new sleeping coaches for the Erie Railway will be put on the road when the spring time table takes effect. These cars will run to Chicago without change, notwithstanding the great difference in the gauges of the roads over which they run. Over the Erie road they will of course run on wheels of six-foot gauge. At Buffalo the cars will run under a hoisting machine which will lift the car from the broad-gauge tracks. Should this newest thing in railroading be successful, it will relieve the public from many annoyances from varying railroad gauges, of which there are five (including the "narrow gauge") in the country. The attempt some years ago to make car-wheels movable on their axles so as to accommodate different gauges, it was thought at the time, would fill the requirements, and it has, to some extent, on freight-cars, the shifting being done by running the cars on gradually converging or diverging trucks until the narrower or broader gauge is reached. Then the wheels are again locked.

Covering Wire with Rubber, Etc.

A foreign exchange describes as follows a new invention for covering wire with india-rubber and similar substances, and for making tubing of the same:—"The machine, more particularly designed for covering telegraph-wire with insulating material, comprises a cylinder for holding the india-rubber or other gummy substance, and in this cylinder a screw of the same or nearly the same diameter extends through one end, and is supported in bearings and rotated by gearing applied outside the cylinder. At one end of the cylinder is placed the die through which the substance or compound is forced to form the covering or tube, and through which the wire and the substance pass together. The die is arranged at a right angle to the axis of the cylinder, so that the wire passes transversely across the end of the screw or at a right angle to its axis. In a line with the die and inserted through the opposite side of the extension piece is a tubular guide, through which the wire to be covered is admitted and passed to the die. At the rear end of the machine is placed a thrust-pin to receive and sustain the end of the screw against the back pressure. The thrust-pin is formed with a screw-thread, and is thereby adjustable in a socket fixed on the machine."

British Capital for American Industries.—A new joint-stock company has been formed in Glasgow for the purpose of acquiring and working mines and other property in the State of Ohio. The property extends to 860 acres, and contains extensive deposits of black-lead, clay-band, and ball ironstone, besides coal and clay. The capital of the company is £250,000, in £10 shares, and mining operations have already been begun under the management of gentlemen connected with Glasgow.

ENGLISH PATENT JOURNAL.

LIST OF APPLICATIONS FOR PATENTS ON WHICH Provisional Protections HAVE BEEN OBTAINED IN ENGLAND BY OR FOR AMERICAN INVENTORS.

[*This list is condensed weekly from the "Journal of the British Commissioners of Patents," expressly for the* "American Artisan."]

339.—Sewing leather, etc.—G. V. Sheffield, Providence, and G. K. Mellor, Woonsocket, R. I.—Feb. 7, 1872.

406.—Weighing machine.—A H. Emery, New York City.—Feb. 7, 1872.

419.—Steam-generator, etc.—A. G. Buzby, Philadelphia, Pa.—Feb. 9, 1872.

420.—Refrigerating apparatus.—J. Gravenstine, Philadelphia, Pa., and De W. C. Taylor, New York City.—Feb. 9, 1872.

421.—Mowing and reaping machine.—W. Sprague, South Kingstown, R. I.—Feb. 9, 1872.

437.—Apparatus for propelling vessels.—W. Condell, New York City.—Feb. 10, 1872.

450.—Postal card.—A. L. McCrea, Washington, D. C.—Feb. 13, 1872.

481.—Harvesting machine.—L. Miller, Akron, Ohio.—Feb. 15, 1872.

495.—Dust-shield for railway carriages.—W. McK. Thornton and T. A. Buckland, St. Louis, Mo.—Feb. 16, 1872.

500.—Manufacture of boots and shoes, etc.—W. J. B. Mills, Philadelphia, Pa., and De W. C. Taylor, Elizabeth, N. J.—Feb. 16, 1872.

501.—Shuttle for weaving narrow fabrics.—J. Martin, Lowell, Mass.—Feb. 16, 1872.

525.—Packing caustic alkalies, etc.—J. H. Seibert, Philadelphia, Pa.—Feb. 17, 1872.

530.—Sail hank.—D. G. Low, Chelsea, Mass.—Feb. 19, 1872.

533.—Car-coupling.—F. F. Taylor and H. W. Larkin, San Francisco, Cal.—Feb. 19, 1872.

536.—Machine for cutting textile fabrics.—A. Warth, Stapleton, N. Y., and W. F. Jobbins, New York City.—Feb. 19, 1872.

537.—Rake for harvesting machines.—D. M. Osborne, Auburn, N. Y.—Feb. 19, 1872.

538.—Lawn-mowing machine.—E. G. Passmore, Philadelphia, Pa.—Feb. 19, 1872.

OFFICIAL LIST OF PATENTS

ISSUED FROM THE UNITED STATES PATENT OFFICE

For the Week ending March 12, 1872,

AND EACH BEARING THAT DATE.

[Reported officially for the "American Artisan."]

PATENT CLAIMS, DRAWINGS, AND SPECIFICATIONS.—*Owing to the constantly increasing number of patents issued, we have—as we must have done sooner or later—ceased to publish the Claims, and instead thereof we publish the names of the patentees, with the titles of their inventions, with descriptions on another page of some of the more important inventions; but we are prepared to furnish immediately on application, or by return mail, when requested by letter, a copy of the claims of any existing patent, for - 75 cents.*
We also furnish a printed copy of the whole specification of any patent issued since November 20, 1866, for - - $1 25
We will also supply a sketch of the parts claimed in any patent, or a full copy of the drawing thereof, at charges varying from $1 upwards.

ADVICE TO INVENTORS AND PATENTEES.

Whenever asked, we will promptly send, gratis, our recently published pamphlet, entitled "IMPORTANT INFORMATION FOR INVENTORS AND PATENTEES," *containing details of the proceedings necessary to be taken by inventors desirous of obtaining Letters-Patent in the United States. Also, Instructions to Patentees concerning Re-issues, Extensions, Infringements, Foreign Patents, etc.*

Address BROWN, COOMBS & CO., *Solicitors of American and Foreign Patents,* 189 *Broadway, New York.*

124,414.—MANUFACTURE OF DIES.—Freeling W. Arvine, Fair Haven, Conn., assignor to George F. Champney, Taunton, Mass.

124,415.—MECHANICAL POWER.—Noah A. Baker, assignor to himself and J. O'Hara, Jun., Covington, Ky.

124,416.—PAWL ATTACHMENT.—Noah A. Baker, assignor to himself and J. O'Hara, Jun., Covington, Ky.

124,417.—ANIMAL TRAP.—Lafayette C. Chamberlin, Osawatomie, Kan.

124,418.—BAGGAGE-CHECK.—Marion N. Coe, Water Valley, Miss.

124,419.—PRESERVING WOOD.—Seth L. Cole, Brooklyn, N. Y.

124,420.—PROCESS OF PRESERVING WOOD.—Seth L. Cole, Brooklyn, N. Y. Ante-dated March 2, 1872.

124,421.—BOILER-TUBE SCRAPER.—John Collicott, West Roxbury, Mass.

124,422.—BOLT FOR DOUBLE DOORS, ETC.—David B. Conklin, assignor to himself and Nathaniel Conklin, Hardwick, N. J.

124,423.—BOOK-SUPPORT.—Jay Densmore, Holley, assignor of one-half his right to Charles B. Sparrow, Knowlesville, N. Y.

124,424.—DOOR-LOCK.—Wilson P. Dodson, Philadelphia, Pa.

124,425.—HYDROCARBON-VAPOR BURNER.—H. William Dopp and Michael J. Stark, Buffalo, N. Y., assignors to William S. Mead, New York City.

124,426.—TOBACCO-CUTTER.—John Elberweiser, Cincinnati, Ohio.

124,427.—APPARATUS FOR PRESS-DYEING STRIPES FOR FLAGS.—De Witt C. Farrington, Lowell, Mass.

124,428.—APPARATUS FOR PRESS-DYEING STARS FOR FLAGS.—De Witt C. Farrington, Lowell, Mass.

124,429.—MUCILAGE-HOLDER.—Alexander Hamilton Fatzinger, New York City.

124,430.—RAILWAY CAR-COUPLING.—Amos C. Fell, Caledonia, Ohio. Ante-dated Feb. 21, 1872.

124,431.—MACHINE FOR SHEETING DOUGH.—Dwight B. Fuller, Philadelphia, Pa.

124,432.—MEDICINE-CHEST FOR VETERINARY SURGEONS.—John W. Gadsden, Philadelphia, Pa.

124,433.—CARRIAGE-SEAT.—Simon P. Graham, London, Canada, assignor to Theodore Comstock, Ezra Booth, and Henry F. Booth, Columbus, Ohio.

124,434.—PUMP.—Edward Graser, Union City, Pa.

124,435.—SPOKE-SHAVE.—Jacob Groben, assignor to himself and Samuel D. Sikes, Buffalo, N. Y.

124,436.—SPRING BED-BOTTOM.—Samuel M. Guest, assignor of one-half his right to William A. Le Row, Chicago, Ill.

124,437.—TYPE-WRITING MACHINE.—Benton Halstead, assignor of one-third his right to Joseph W. Miller, Cincinnati, Ohio.

124,438.—LOCK-HINGE FOR TABLES, ETC.—Eli E. Hendrick, Carbondale, assignor to himself and Walter W. Winton, Scranton, Pa.

124,439.—METALLIC STUFFING-BOX.—William H. Holland, Boston, Mass.

124,440.—MOWING MACHINE.—William G. Kenyon, Wakefield, R. I.

124,441.—MANUFACTURE OF ILLUMINATING-GAS FROM COAL-TAR.—Joshua Kidd, New York City.

124,442.—BOLT.—Moses D. Kinkade, Brooklyn, N. Y. Ante-dated Feb. 22, 1872.

124,443.—TOOL-HANDLE.—Warren M. Knight, Greenfield, Mass.

124,444.—HORSE-COLLAR CAP.—Arnold P. Mason, assignor of two-thirds of his right to William H. Bard, Franklinville, and Gilbert W. Strong, Machias, N. Y.

124,445.—BROOM-HOLDER.—Horace B. McCool, Pottsville, Pa.

124,446.—ORNAMENTING HARNESS.—Franz Meinberg, New York City.

124,447.—EXTENSION-TABLE.—Eli Pond, Jun., Woonsocket, R. I. Ante-dated Feb. 24, 1872.

124,448.—BRICK AND MORTAR HOD.—Carl Roehl, Chicago, Ill.

124,449.—STAPLE FOR SATCHELS.—William Roemer, Newark, N. J.

124,450.—COTTON-PLANTER.—Nils F. Sandelin, New York City. Ante-dated Feb. 22, 1872.

124,451.—ATTACHMENT FOR TRACES.—Peter J. Schmitz, Winona, Minn.

124,452.—HORSESHOEING-JACK.—John Shimer, Scranton Station, Iowa. Ante-dated Feb. 29, 1872.

124,453.—FIREPROOF BUILDING.—Samuel W. Sisson and W. Chauncey Wetmore, Pulaski, Mich.

124,454.—COFFEE-POT.—J. B. Smith, Milwaukee, Wis., assignor to George R. Crittenden, Chicago, Ill. Ante-dated Feb. 28, 1872.

124,455.—PRUNING-SHEARS.—Oscar Snell, Williamsburg, Ohio.

124,456.—STOVE-PIPE DAMPER.—James Spear, Philadelphia, Pa.

124,457.—SOAP-COOLER.—James D. Sturges, Chicago, Ill.

124,458.—MEDICAL COMPOUND FOR CURE OF YELLOW FEVER, ETC.—Thomas H. Thompson, assigner to himself and T. J. Ellis, Grenada, Mass. Ante-dated Feb. 22, 1872.

124,459.—CRACKER-BOX.—Charles F. Thurston, Cambridgeport, Mass.

124,460.—PRINTING-PRESS.—Stephen D. Tucker, New York City.

124,461.—APPARATUS FOR SPONGING CLOTH.—Edward Utley, Appleton, Wis.

124,462.—TEA-KETTLE.—James W. Ward, assignor to himself and J. Boone McLure, Wheeling, W. Va. Ante-dated Feb. 24, 1872.

124,463.—FLOCK-GRINDER.—James Waterhouse, Passaic, N. J.

124,464.—FRUIT-GATHERER.—Jason Waters, West Sutton, Mass.

124,465.—BEER AND WATER COOLER.—John Weinberger, New Orleans, La. Ante-dated Feb. 22, 1872.

124,466.—SHEET-METAL CAN.—John Widgery, Plumstead, England.

124,467.—SMELTING-FURNACE.—Peter M. Wilson, Brooklyn, N. Y., assignor to himself, Manning Merrill, and Edward W. Merrill, New York City.

124,468.—CARRIAGE-WHEEL.—Jacob Woodburn, St. Louis, Mo., assignor to Woodburn Sarvin Wheel Company, Indianapolis, Ind.

124,469.—RACK FOR HATS, BUNDLES, ETC.—Charles A. Young, Providence, R. I. Ante-dated Feb. 21, 1872.

124,470.—UPRIGHT PIANO.—Oskar Altenburg, New York City.

124,471.—WATER-WHEEL.—Vincent M. Baker, Preston, Minn.

124,472.—WATER-WHEEL.—Vincent M. Baker, Preston, Minn.

124,473.—BACK-BRACE.—Edmund P. Banning, Jun., assignor to "Banning Truss and Brace Co.," New York City.

124,474.—UTERINE SUPPORTER.—Edmund P. Banning, Jun., assignor to "Banning Truss and Brace Co.," New York City.

124,475.—TRUSS.—Edmund P. Banning, Jun., assignor to "Banning Truss and Brace Co.," New York City.

124,476.—CLUTCH FOR MACHINERY.—Francis G. Bates, Springfield, Mass., assignor to himself, Peter Ferguson, New Haven County, and Rufus Baker, Middletown, Conn.

124,477.—FENCE.—Albert C. Betts, Troy, N. Y.

124,478.—ANIMAL-POKE.—Burton E. Blakslee, Medina, Ohio.

124,479.—MACHINERY FOR BURNISHING THE SHANKS OF BOOTS AND SHOES.—James K. Blanchard, Frederick S. Hunt, Lynn, and Augustus C. Carey, Malden, assignors to themselves and Dean Peabody, Lynn, Mass.

124,480.—GANG-PLOW.—Samuel D. Bowen, and Americas M. Abbot, Stockton, Cal.

124,481.—STEAM-CYLINDER FOR FINISHING CLOTH.—Adna Brown, Springfield, Vt.

124,482.—MACHINE FOR DRESSING BOOT AND SHOE HEELS.—William H. Bush, New Haven, Conn.

124,483.—MACHINE FOR CUTTING STAVES.—Adam Cook, St. Clair Borough, Pa.

124,484.—CENTRIFUGAL MACHINE FOR DRAINING SUGAR, ETC.—John Corby, assignor to Hugh W. Lafferty and Robert Lafferty, Gravesend, England. Ante-dated Feb. 29, 1872.

124,485.—COMPOSITION FOR JOURNAL-BEARINGS.—Sylvester Croll, assignor of two-thirds his right to Reuben T. Barrett and Edward T. Plush, Philadelphia, Pa.

124,486.—CORN-HUSKERS.—James M. Evarts, New Haven, Conn.

124,487.—FERTILIZER.—James Fox and Andrew Fox, Avoca, N. Y.

124,488.—SPINDLE FOR SPINNING MACHINES.—Thomas H. Gray, Walpole, Mass.

124,489.—SAW-SET.—Albert Harper and John Würfflein, Waverly Heights, Pa.

124,490.—CAR-COUPLING.—Henry Hawley, Lynchburg, Va.

124,491.—WINDOW-SASH BEARING.—John B. Hornbake, Greenfield, Pa.

124,492.—CONSTRUCTION OF FUNNEL ATTACHMENTS FOR LIQUID MEASURES.—Cornelius C. Jadwin, Honesdale, Pa.

124,493.—ATTACHMENT FOR SEWING-MACHINES.—John C. Jensen, Chicago, Ill. Ante-dated March 2, 1872.

124,494.—OYSTER-STEAMER.—William A. Jones, Erie, Pa.

124,495.—AMMONIA GAS-ENGINE.—Emile Lamm, New Orleans, La.

124,496.—HEATING-STOVE.—William H. Landon, Princeton, Canada.

124,497.—HACKLING MACHINE.—Louis F. Lannay and James Webb, Baltimore, Md.

124,498.—MINERS' BOOTS AND SHOES.—George Latham and John Burton, Jeddo, Pa.

124,499.—WINDMILL.—Giles Mabie, Dixon, Ill.

124,500.—VELOCIPEDE.—David Martin, Harrisburg, Pa.

124,501.—SHUTTLE-ACTUATING MECHANISM FOR LOOMS.—Thos. Martin, assignor to the Boston Elastic Fabric Company, Chelsea, Mass.

124,502.—FENCE.—John McKnight, Romulus, N. Y.

124,503.—DOOR-SECURER.—Bryant H. Melendy, Amherst, N. H.

124,504.—CONSTRUCTION OF RAFTS.—John T. Moore, Havre De Grace, and Ravand K. Hawley, Baltimore, Md.

124,505.—FIRE-LIGHTER.—James R. Murphy, Chicago, Ill.

124,506.—HORSE-BLANKET ADJUSTER.—Andrew Z. Neff, Amsterdam, N. Y.

124,507.—SPRING BED-BOTTOM.—Warren Owen and Stephen Harter, Piercetown, Ind.

124,508.—GATE.—William H. Phillips, Staunton, Ind.

124,509.—COMPOSITION PAVEMENT.—Thomas Price, assignor to himself and John D. Burton, Pittsburg, Pa.

124,510.—EXPLOSIVE COMPOUND FROM GUN-COTTON.—Robert Punshon, Newcastle-upon-Tyne, England.

124,511.—BOAT-DETACHING APPARATUS.—Christian Quaritius, Canarsie, N. Y.

124,512.—SHOE.—Joshua P. Rand, Dallas City, Ill.

124,513.—STEAM-GENERATOR.—David Renshaw, Syracuse, N. Y.

124,514.—BUCKLE.—Robert F. Russel, Hazleton, Pa.

124,515.—FASTENER FOR THE MEETING-RAILS OF SASHES.—William E. Sparks, assignor to Sargent & Co., New Haven, Conn.

124,516.—FENCE.—John H. Stone, Chapel Hill, Tex.

124,517.—TOOL-HANDLE FASTENING.—Alanson R. Sweat, assignor to himself and B. B. Mastick, Harlan, Iowa.

124,518.—STEP-LADDER.—Orange M. Sweet, assignor to Jeremiah O. Brown, Forestville, N. Y.

124,519.—LIFTING-JACK.—Beers B. Tomlinson, Mt. Carroll, Ill.

124,520.—ATMOSPHERIC ENGINE.—Silas E. Tuttle, Evansville, Wis.

124,521.—GIRDER FOR RAILWAYS.—Richard M. Upjohn, New York City.

124,522.—BOB SLED.—John Wampach, Shakopee, Minn.

124,523.—GOVERNOR.—John S. Warren, Fishkill-on-the-Hudson, N. Y.

124,524.—SAW-MILL.—Samuel Weymouth, assignor to H. F. Snyder and G. S. Snyder, Williamsport, and Antes Snyder, Freeport, Pa.

124,525.—OVERSHOE.—John Wild, assignor to the Woonsocket Rubber Company, Woonsocket, R. I. Ante-dated Feb. 24, 1872.

124,526.—LADDER.—George W. Willis, Atchison, Kan.

124,527.—ELASTIC GORING FOR BOOTS AND SHOES.—Charles Winslow, Boston, Mass.

124,528.—WINDOW-SASH SUPPORTER.—Ralph L. Young, North Topeka, Kan.

124,529.—FRICTION-CLUTCH.—Henry Aiken, Philadelphia, Pa.

124,530.—APPARATUS FOR HEATING AND EVAPORATING LIQUIDS BY STEAM.—Benjamin T. Babbitt, New York City.

124,531.—ELEVATOR CONNECTED TO WAGON-BODIES.—Matthew G. Balfour, Mason City, Iowa.

124,532.—HITCHING AND SIGN POST.—Charles F. Barnard, Victoria, British Columbia.

124,533.—HAIR RESTORATIVE.—Edward W. Barnes, Syracuse, N. Y. Ante-dated Feb. 28, 1872.

124,534.—FIRE-EXTINGUISHER.—Edward Barrett, assignor to himself and Daniel L. Braine, New York City.

124,535.—DOOR FOR GRAIN-CARS.—John Bassler, Galesburg, Ill.

124,536.—CHURN-DASHER.—Silas E. Bauder, Birmingham, Ohio. Ante-dated March 8, 1872.

124,537.—THREE-HORSE EQUALIZER.—John Blackwood, Lithopolis, Ohio.

124,538.—BRICK-KILN.—Francis Felix Boudrye, San Francisco, Cal.

124,539.—MEANS FOR SECURING COVERS OF MILK-CANS.—Nelson C. Barnap, Argusville, N. Y.

124,540.—PERMUTATION LOCK.—William C. Bussey, San Francisco, Cal.

124,541.—FIRE-ESCAPE LADDER.—Carl Gustav Buttkereit, Toledo, Iowa.

124,542.—MANUFACTURE OF INDIA-RUBBER CLOTH GOODS.—Wheeler Cable, Boston, Mass.

124,543.—CLOTHES-DRIER.—James Caffrey, Covington, Ky., assignor to Closson & Timberlake, Cincinnati, Ohio.

124,544.—MANUFACTURE OF WRITING-INK.—John W. Carter, Boston, Mass.

124,545.—CIGAR-HOLDER.—John K. Chase, assignor of one-half his right to George W. Corey, New York City.

124,546.—FAUCET.—William Cleveland, Orange, N. J.

124,547.—HORSE-YOKE.—George P. Cole, assignor of two-thirds of his right to Clemons Hathaway and William C. Moore, Hudson, Mich.

124,548.—WASHING MACHINE.—James E. Connolly, Dublin, Md.

124,549.—WINDOW-CORNICE.—Daniel Cony, Augusta, Maine, and John H. Norcross, Melrose, assignors to themselves and E. R. Wiggin, Boston, Mass.

124,550.—PAPER-FEEDING MACHINE.—Aaron M. Crane, Staunton, Va. Ante-dated March 1, 1872.

124,551.—PROPELLING CARS BY STATIONARY POWER.—Aylett R. Crihfield, Lincoln, Ill.

124,552.—COMBINED HAT-RACK AND UMBRELLA-STAND.—John W. Currier, Springfield, Mass., assignor of one-half his right to Remington James, Lockport, N. Y.

124,553.—ARTIFICIAL FUEL.—Horace Cutler, Springfield, Mass. Ante-dated March 8, 1872.

124,554.—WHEEL FOR VEHICLES.—James Davis, Long Island City, N. Y. Ante-dated March 9, 1872.

124,555.—SHOW-STAND FOR WINDOWS.—John P. Doughten, Wilmington, Del.

124,556.—LINK.—George W. Dyer, Crestline, Ohio.

124,557.—MANUFACTURE OF IMITATION MARBLE.—Josiah S. Elliott, Chelsea, and John F. Wood, Everett, Mass.

124,558.—MANUFACTURE OF MILLSTONES.—Josiah S. Elliott, Chelsea, and John F. Wood, Everett, Mass.

124,559.—PROCESS OF REPAIRING MILLSTONES.—Josiah S. Elliott, Chelsea, and John F. Wood, Everett, Mass.

124,560.—SAFETY-SHOE FOR RAILWAY-CARS.—Samuel W. Emery and Erasmus P. Doyen, Portland, Maine. Ante-dated March 8, 1872.

124,561.—AUTOMATIC SAFETY-GATES FOR RAILWAYS.—William H. Emmons, New York City, and John H. Lee, Boston, Mass.

124,562.—MANUFACTURE OF IMITATION MARBLE.—Adolph Fischer, New York City.

124,563.—PUMP.—Patrick Foley, Adams, N. Y.

124,564.—STRAW-STACKER.—Shelby Fullen, Franklin, Ind.

124,565.—FIRE-EXTINGUISHER.—Joseph Gardner, Louisville, Ky.

124,566.—COMBINED TOOL.—Thomas Garrick, Providence, R. I.

124,567.—LAMP-EXTINGUISHER.—John M. Goodridge, Norfolk, Va.

124,568.—MACHINE FOR MAKING TIN-LINED LEAD PIPE.—James E. Granniss, New York City.

124,569.—MACHINE FOR PAINTING WIRE-CLOTH.—Samuel Graves, San Francisco, Cal.

124,570.—COMBINED TAP AND CUTTER.—John Gunn, Webster, Mass.

124,571.—GANG PLOW.—George W. Haines, Maine Prairie, Cal. Ante-dated March 7, 1872.

124,572.—ROTARY ENGINE.—William Hall, Freeport, Ill.

124,573.—ANTI-FRICTION JOURNAL.—Alexander W. Hall, Adrian, Ohio, and Melville E. Dayton, Syracuse, N. Y.

124,574.—TRACTION ENGINE.—William Wallace Hanscom, San Francisco, Cal.

124,575.—TOY.—Joseph M. Hartz, New York City.

124,576.—MANUFACTURE OF BIRD-CAGES.—Julius Hepp, assignor to O. Lindemann & Co., New York City.

124,577.—FURNITURE-BUTTON.—Jonathan H. Howcroft, assignor to Joseph Hargrave, Cincinnati, Ohio.

124,578.—SEPARATING ORES.—Alfred Huet and Alfred Geyler, Paris, France.

124,579.—COFFEE-POT.—William Nelson Hutchinson, Wellesbourne, Bideford, England.

124,580.—SNAP-HOOK AND BUCKLE.—Louis B. Jackson, Delaware, Ohio, assignor to himself and Daniel B. Groff, Indianapolis, Ind. Ante-dated March 1, 1872.

124,581.—CAR-BRAKE.—J. Wiley Jacobs, Jeffersonville, Ind.

124,582.—REFLECTING CHANDELIER.—Charles F. Jacobsen, New York City.

124,583.—MANUFACTURE OF ARTIFICIAL STONE.—Thomas A. Jebb, Buffalo, N. Y.

124,584.—DUST-PAN.—Ralph S. Jennings, Philadelphia, Pa. Ante-dated March 9, 1872.

124,585.—POTATO-DIGGER.—Moses Johnson, Three Rivers, Mich.

124,586.—HARROW.—Alvarado Jones, Randolph, Wis.

124,587.—HARVESTER.—J. Herva Jones, Rockford, Ill.

124,588.—STRIKING-BAG.—Simon D. Kehoe, Brooklyn, N. Y.

124,589.—DEVICE FOR LUBRICATING LOOSE PULLEYS.—Frederick Keifel, Cincinnati, Ohio.

124,590.—BRICK MACHINE.—Philip H. Kells, Adrian, Mich.

124,591.—(Canceled.)

124,592.—BRAKE FOR INCLINED PLANES AND HOISTS.—Leopold Klee, Pittsburg, Pa.

124,593.—GARDEN-PUMP.—Carl G. Korth, Carlstadt, N. J.

124,594.—CHLORIDE OF CALCIUM ENGINE.—Emile Lamm, New Orleans, La.

124,595.—MODE OF LUBRICATING AXLES OR JOURNALS.—Robert V. Laney, Cumberland, Md.

124,596.—LUBRICATING WHEEL OR PULLEY.—Robert Vance Laney, Cumberland, Md.

124,597.—BOX AND SLEEVE FOR WHEELS AND JOURNALS.—Robert V. Laney, Cumberland, Md.

124,598.—ELASTIC BATTING OR WADDING FOR UPHOLSTERY PURPOSES.—Isaac Lindsley and John Mackintosh, Pawtucket, R. I.

124,599.—FABRIC FOR HEAD-COVERINGS.—Henry Loewenberg, New York City.

124,600.—GATE.—John C. Long, Eaton, Ind.

124,601.—CASK AND BARREL.—John Marshall, Brooklyn, N. Y. Ante-dated Feb. 21, 1872.

124,602.—TAILOR'S SCALE.—Hugh Matheson, Toronto, Canada.

124,603.—WASH-BOILER.—John T. Maxson, De Witt, Iowa.

124,604.—CORD-CLAMP.—Samuel W. Meredith assignor to himself and Irvin Robbins, Greensburg, Ind.

124,605.—BREAD-TOASTER.—Daniel Miller, assignor to himself and Jacob Miller, Marietta, Ohio.

124,606.—THROTTLE-VALVE LEVER FOR LOCOMOTIVES.—John Mills, Newfield, N. J., assignor of one-half his right to Thomas Timmins, Philadelphia, Pa.

124,607.—PHOTOGRAPHIC APPARATUS.—Robert H. Mims, Edgefield Court House, S. C.

124,608.—WASH-BOILER.—Joseph Moreland, Thomas P. Reay, and John M. Lazier, Morgantown, West Va.

124,609.—COMBINED BEDSTEAD AND WARDROBE.—John A. Morgan, Bloomfield, Iowa.

124,610.—HOLDER FOR PAINTER'S USE.—Samuel J. Newell, Dirigo, Maine.

124,611.—METALLIC LATHING.—Kittil Nirison, Chicago, Ill. Ante-dated March 8, 1872.

124,612.—PAPER-MAKING MACHINERY.—Thomas Nugent, Whippany, N. J.

124,613.—RAILROAD-CAR VENTILATOR.—Robert L. Omensetter, Philadelphia, Pa.

124,614.—HOISTING APPARATUS AND SAFETY-HATCH.—James W. Osgood, assignor to Harriet Osgood, New York City.

124,615.—IMITATION GOLD VARNISH.—Richard Parke, assignor to himself and Hannah B. Mountain, New York City.

124,616.—ORNAMENTING WOOD, METAL, ETC.—Richard Parke, assignor of one-half his right to Hannah B. Mountain, New York City.

124,617.—CEMENT FOR MENDING CHINA, GLASS, ETC.—Robert W. Patten, New York City.

124,618.—CAR-AXLE LUBRICATOR.—Thomas H. Paul, Frostburg, Md.

124,619.—DIE FOR FORGING HARROW-TEETH.—John Pedder and George Abel, West Pittsburg, Pa.

124,620.—CONCRETE PAVEMENT.—Amos H. Perkins, Chicago, Ill.

124,621.—VELOCIPEDE.—Louis G. Perreaux, Paris, France.

124,622.—CANAL-BOAT.—Isaac M. Perry, Slate Cut, Ind.

124,623.—RAILWAY FROG.—Denison C. Pierce, Clayton, N. Y.

124,624.—WATER AND SEWER PIPE.—James S. Pierson, New York City.

124,625.—RAILWAY STOCK-CAR.—Amos Rank, Salem, Iowa.

124,626.—RAILWAY STOCK-CAR.—Amos Rank, Salem, Iowa.

124,627.—HINGE.—Victor Rathknecht, Chicago, Ill.

124,628.—HARNESS-SNAP.—Samuel Reynolds, Alleghany, Pa.

124,629.—CIGAR MACHINE.—Richard B. Robbins, Adrian, Mich.

124,630.—ORNAMENTING FURNITURE.—James E. Rogers, Chelsea, Mass., assignor to George W. Downing, Providence, R. I.

124,631.—EXTENSION SHELF OR BRACKET.—Anthony Rosenfield, San Francisco, Cal.

124,632.—LET-OFF MECHANISM FOR LOOMS.—Charles R. Saatweber, New York City.

124,633.—FUR TASSEL.—John Schmid, assignor to himself and Gustav W. Brostrom, Boston, Mass.

124,634.—DUST-BRUSH.—Augustus Schelling, Erie, Pa.

124,635.—FISHING-SEINE.—Henry Smith, Salem, Mass.

124,636.—WAGON-BRAKE.—Adam Snyder, Knox Township, Ohio.

124,637.—QUARTZ MILL.—William C. Stiles, Nevada City, Cal.

124,638.—BOOT AND SHOE SHAVE.—Byron A. Stockwell, Sutton, Mass.

124,639.—STEAM-PUMP.—Charles Swinscoe, Boston, Mass.

124,640.—SASH-HOLDER.—Hanson P. Tenant, East Germantown, Ind.

124,641.—STEAMSHIP AND STEAMBOAT BUILDING.—Ambrose W. Thomson, New York City.

124,642.—LUBRICATOR FOR CAR-AXLE BOXES.—Joseph Trent, Brooklyn, N. Y.

124,643.—CORN-PLANTER.—John M. E. Valk, assignor to John E. Valk, Baltimore, Md.

124,644.—LOCK-WASHER.—William H. Van Cleve, Ypsilanti, Mich.

124,645.—MACHINE FOR THREADING METALLIC SCREWS AND BOLTS.—Benjamin L. Walker, Sing Sing, N. Y.

124,646.—RAILWAY RAIL CHAIR.—John G. Wands, Nashville Tenn.

124,647.—BORING-MILL.—Jerome Wheelock, Worcester, Mass.

124,648.—CAR-COUPLING.—Henry E. Wolcott, assignor of one-fourth his right to Chas. G. McGowan, and one-fourth his right to Nathan Munro, Elbridge, N. Y.

124,649.—WASHING-MACHINE.—Asa E. Worden, Smyrna, Del.

124,650.—PAPER-CUTTING MACHINE.—Joseph Warell, Philadelphia, Pa., assignor to Joseph S. Sanborn, New York City.

124,651.—WASHING MACHINE.—James E. North, Owego, N. Y.

124,652.—FIBER TO IMITATE HAIR.—Werner Stauf, Bonn, Prussia.

RE-ISSUES.

4,794.—BUTTON-HOLE ATTACHMENT FOR SEWING-MACHINES.—(Div. A.)—Samuel J. Baird, Waynesborough, Va. Patent No. 97,856, dated Dec. 14, 1869.

4,795.—MECHANICAL MOVEMENT.—(Div. B.)—Samuel J. Baird, Waynesborough, Va. Patent No. 97,856, dated Dec. 14, 1869.

4,796.—APPARATUS FOR TESTING CANS, BARRELS, ETC.—William D. Brooks, assignor to Mary C. Brooks, Baltimore Md. Patent No. 121,581, Dec. 5, 1871.

4,797.—SEALING DIP-PIPES OF GAS APPARATUS.—Rufus B. Chapman, assignor, by mesne-assignments, to John C. Chapman, Frederick J. Davis, and John F. Farnum, Waltham, Mass. Patent No. 117,602, dated Aug. 1, 1871.

4,798.—MEDICAL COMPOUND OR COFFEE ANTIDOTE.—Edelmar De Hays Saint Cyr, Lowell, Mass. Patent No. 121,665, dated Dec. 5, 1871.

4,799.—BOOT AND SHOE STRETCHER.—Warren Holden, Philadelphia, Pa., assignor, by mesne-assignments, to the Stiles & Parker Press Company, Middletown, Conn. Patent No. 12,793, dated May 1, 1855; extended seven years.

4,800.—APPARATUS FOR THE MANUFACTURE OF ILLUMINATING-GAS.—Edward Jones, assignor to the American Coal-gas Light Improvement Company, Boston, Mass. Patent No. 116,450, dated June 27, 1871.

4,801.—HOISTING APPARATUS FOR COAL-BARGES AND FOR OTHER PURPOSES.—Julius A. Preston, assignor, by mesne-assignments, to the American Coal-Barge Company, New Haven, Conn. Patent No. 69,245, dated Sept. 24, 1867.

4,802.—ROTARY PUMP.—Anthony Sluthour, New Philadelphia, Ohio. Patent No. 102,057, dated April 19, 1870.

4,803.—DEODORIZING WATER-CLOSETS.—George E. Waring, Jun., Newport, R. I., assignor to the Earth-closet Company, Hartford, Conn. Patent No. 90,709, dated June 1, 1869.

4,804.—DEODORIZING WATER-CLOSETS.—(Div. B.)—George E. Waring, Jun., Newport, R. I., assignor to the Earth closet Company, Hartford, Conn. Patent No. 90,709, dated June 1, 1869.

4,805.—APPARATUS FOR ROLLING BOOT AND SHOE SEAMS.—John C. White, assignor, by mesne-assignments, to Allen W. Thomas, Auburn, N. Y. Patent No. 59,515, dated Aug. 11, 1863.

4,806.—STEAM AND GAS ENGINE.—Joel A. H. Ellis, Springfield, Vt. Patent No. 108,571, dated Oct. 25, 1870.

DESIGNS.

5,639.—CARPET PATTERN.—Alphonse J. Bouet, assignor to Henry Jecks Dixon & Sons, Kidderminster, England.

5,640 to 5,645.—CARPET-PATTERN.—Arthur M. King, assignor to Henry Jecks Dixon & Sons, Kidderminster, England.

5,646 and 5,647.—CARPET-PATTERN.—Archibald McCallum, Halifax, England, assignor to Joseph Wild & Co., New York City.

5,648.—METAL PAIL OR CAN.—George C. Napheys, assignor to George C. Napheys & Son, Philadelphia, Pa.

5,649 and 5,650.—CARPET-PATTERN.—Edward Poole, Halifax, England, assignor to Joseph Wild & Co., New York City.

5,651 and 5,652.—CARPET-PATTERN.—Herbert Robinson, Halifax, England, assignor to Joseph Wild & Co., New York City.

TRADE-MARKS.

694.—"AMERICAN STERLING" METAL.—American Sterling Company, New York City.

695.—MEN'S BOOTS.—Clement, Colburn & Co., Boston, Mass.

696.—WHISKY.—Frieberg & Workum, Cincinnati, Ohio.

697.—SUGAR-CURED HAMS, ETC.—James Morrison & Co., Cincinnati, Ohio.

698.—BRONZE ALLOYS.—Phosphor-Bronze Company, Pittsburg, Pa.

699.—BEARINGS OF BRONZE ALLOYS FOR AXLES, ETC.—Phosphor-Bronze Company, Pittsburg, Pa.

700 and 701.—CANNED AND PRESERVED VEGETABLES, ETC.—Sleeper, Wells & Aldrich, Burlington, N. J.

702.—WHISKY.—Walsh, Brooks & Kellogg, Cincinnati, Ohio.

EXTENSIONS.

19,487.—CONTINUOUS METALLIC LATHING.—Birdsall Cornell. March 2, 1858.

19,462.—STRAW-CUTTER.—Thomas H. Willson and Daniel T. Willson. Feb. 23, 1858.

APPLICATIONS FOR EXTENSIONS.

OPPONENTS of extensions must file *written* objections in the Patent Office at least 20 days before the day-of-hearing; and on that day, at noon, they must appear personally, or by proxy, at the Patent Office, and state the reasons of their opposition. All testimony—*pro* or *con*—must be taken and transmitted in accordance with the official rules, which will be furnished on application. The under-named patentees have recently petitioned for extensions (for seven years) of patents granted to them in the year 1858:—

JOEL F. KEELER, Pittsburg, Pa.—*Platform Scales.*—Patented June 8, 1858; testimony will close on May 7, next; last day for filing arguments and examiner's report, May 17; day-of-hearing, May 22.

L. B. STORRS, Canton, N. Y.—*Tailor's Pressing Machine.*—Patented June 8, 1858; testimony will close on May 7, next; last day for filing arguments and examiner's report, May 17; day-of-hearing, May 22.

JAMES A. WOODBURY, Boston, Mass.—*Planing Machine.*—Patented June 8, 1858; testimony will close on May 7, next; last day for filing arguments and examiner's report, May 17; day-of-hearing, May 22.

WILLIAM H. SEYMOUR and DAYTON S. MORGAN, Brockport, N. Y.—*Harvesting Machine.*—Patented June 8, 1858; testimony will close on May 7, next; last day for filing arguments and examiner's report, May 17; day-of-hearing, May 22.

ABIAL C. HERRON, New York City.—*Sewing-machine.*—Patented June 15, 1858; testimony will close on May 14, next; last day for filing arguments and examiner's report, May 24; day-of-hearing, May 29.

STUART PERRY, Newport, N. Y.—*Combination Lock.*—Patented June 22, 1858; testimony will close May 21, next; last day for filing arguments and examiner's report, May 31; day-of-hearing, June 5.

H. BRADFORD, Reading, Pa.—*Ore-separator.*—Patented June 29, 1858; testimony will close on May 28, next; last day for filing arguments and examiner's report, June 7; day-of-hearing, June 12.

WILLIAM POWELL WARE, New York City.—*Ear, Cheek, and Chin Muffs.*—Patented July 6, 1858; re-issued Feb. 12, 1867; testimony will close on June 4, next; last day for filing arguments and examiner's report, June 14; day-of-hearing, June 19.

Letter Box

D. D., OF ILL.—Seven volumes of common clay in powder, seven volumes of burnt fire-clay, and one-half volume of sawdust, mixed and burnt at a white heat, will provide a strong and porous material that will readily permit the passage through it of liquid hydrocarbons, and will probably serve your purpose very well.

E. G., OF MASS.—Regnault determined the compressibility of mercury for each atmosphere at three and one half millionths of its bulk, and that of water at forty-seven millionths of its bulk.

N. L., OF IND.—Bones contain nearly fifty per cent. of gelatine, but only from twelve to fifteen per cent can be extracted by simple boiling. The well-known process of dissolving away the lime by muriatic acid, which leaves the gelatine intact, has been practiced by breaking the bones small and treating them in leaden tanks with four times their weight of acid diluted with water to six degrees Beaumé.

M. R., OF VT.—A white soft-soap may be made by mixing whale-oil and tallow in the proportions of forty parts by measure of the first and sixty of the latter, and boiling with one hundred and fifty pounds of potash lye, at twenty-two degrees Beaumé.

O. C., OF PA.—The best authorities on leather manufacture advocate steam-pipes for heating drying lofts instead of hot air forced in by blowers. Steam-pipes are, furthermore, found to give a much more uniform and reliable heat than stoves.

R. T., OF N. H.—You can probably render your harnesses impervious to water by thoroughly impregnating them with a mixture made in the proportion of twenty-one gallons of pure whale-oil and fifteen to seventeen pounds of India-rubber shreds. Heat these ingredients together at a temperature of from 194° to 240°, which will insure the dissolution of the rubber.

G. S. W., OF N. Y.—Your scarifier for sending a jet of flame down upon the weed-covered surface of the ground is new to us, but we do not see wherein it is preferable to the plan of using a hot iron roller for the same purpose. It may, however, possess merits not fully shown in your somewhat rude sketch.

L. T., OF R. I.—Road engines propelled by jointed legs acting to push the machine along were proposed more than half a century since. They have been proposed for steam-plowing, and the same principle of operation has been experimentally applied on canal-boats, but success in either case appears to have been very slight. As you suggest, a toy locomotive could doubtless be made on that system that would afford considerable amusement.

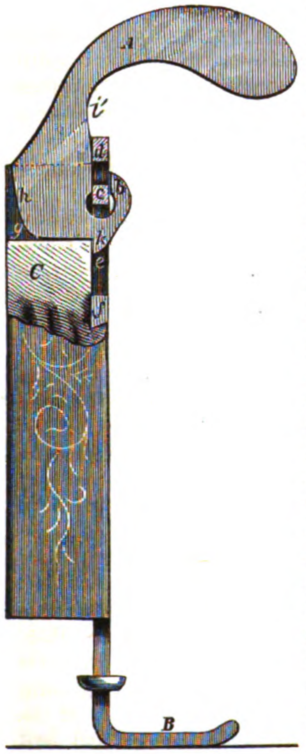
METALLURGIST, OF N. J.—A mechanical puddler in which the puddling tool received a reciprocating motion from a crank on the end of the vertical shaft was described in the *London Mining Journal* some three or four years ago. But we cannot recall either the date of such publication or the details of the apparatus.

L. S. O., OF MINN.—You will probably find that a sheet of lead or other similar metal placed between the thicknesses of leather forming the sole of a boot or shoe, will be quickly disintegrated by the bending of the sole, and fail entirely to secure the waterproof conditions looked for.

STREET RAILWAYS IN LONDON.—With tramways much progress has been made of late in England, and there are at present being worked in London and its suburbs alone no less than 26 miles, while 33 more are already authorized by the Legislature, making a total of 59 miles.

KENNEDY'S PATENT PRESSER-FOOT LIFTER FOR SEWING-MACHINES.

THE improvement herewith illustrated relates to that class of sewing-machines in which the presser-foot has a reciprocating movement in a vertical direction, as for example the Grover & Baker machine, for which the device is more especially designed. Hitherto, in this class of sewing-machines the presser-foot bar, in rising and falling, has produced a corresponding movement of the lifter, throwing it to and fro at each up-and-down movement of the presser-foot, causing no little noise, and by its jumping motion in close proximity to the work being very annoying to the operator. To avoid these objections, the improved appliance is formed with an open eye, *b*, for its fit over and clip of a lifting partition, *c*, that divides an upper orifice, *d*, from the slot, *e*, in the slide or bar, *f*, of the presser-foot, B, said slot providing for the adjustment of the presser-foot to different thicknesses of cloth. C is the presser-arm or frame in a slot, at the top of which the lifter, A, is inserted, and so that on throwing said lifter back till its rear edge, *h*, rests on the bottom of said slot, or lies parallel therewith or thereabouts, the presser-foot is lifted and kept raised by the lifter, A, from contact with the cloth. The front edge, *i*, of this lifter, against which the back of the bar, *f*, rests, is of a curved form, and the lifter generally of a shape so that, every time the presser-foot rises and falls, a corresponding movement or backward and forward motion is communicated to the lifter, as hereinbefore referred to.



This continuous movement and consequent rattle of the lifter is avoided by constructing it as represented in the engraving, in which the lifter, A^1, is formed with a straight front edge, i^1, at the back of the presser-foot bar, *f*, of a length equal to the full stroke of said bar, so that the presser-foot in rising and falling has no action upon the lifter, which remains motionless and silent. Furthermore, said lifter is formed with a tooth or shoulder, *k*, arranged to rest against the presser-arm or frame, C, and serving to keep the lifter from pitching forwards and becoming detached or displaced when the thickness of the material under the presser-foot causes the top of the slot, *e*, in the bar, *f*, to project above the upper outer end of the open eye, *b*, of the lifter. The straight edge, i^1, and shoulder, *k*, combined, make the lifter, A^1, perfect in every respect, both as regards its retention in place and non-interference by the bar, *f*, in the working of the presser-foot.

This improvement was patented through the "American Artisan Patent Agency," Dec. 26, 1871, by Theodore W. Kennedy, of New York City.

Labor-saving Machines.

THE beneficial effect of labor-saving machines in improving the condition of workmen, it is stated, has been exemplified by the application of the sewing-machine to the manufacture of shoes. The workmen of Lynn, Mass., who in 1862 were earning ten dollars a week without the assistance of the leather sewing-machine, are now, it is reported, earning fifty dollars a week with the aid of this useful apparatus. The inventor, who in 1862 was threatened with mob violence, is now considered by the workmen as their greatest benefactor. Within the last ten years the town of Lynn has doubled in population and taxable property, and it is estimated that forty-four million dollars have been saved to the whole country by the invention of the sewing-machine as applied to the manufacture of articles of leather.—*Public Ledger*.

The Oldest American Coal-mine.

A LOCAL correspondent of the Richmond (Va.) *Whig* says:—"Probably it is not generally known among the citizens of Richmond, that the vicinity of our city was the site of the first coal-mine in this country. Bituminous coal was here mined as early as 1700, and in 1775 was extensively used in the vicinity. During the Revolution a Richmond foundry employed this coal in making shot and shell for the use of the Continental forces. From a local celebrity it gradually obtained a national renown, and in 1789 it was being sent to Philadelphia, New York, and even to Boston.

Panama Steamship Lines.

THE extension of ocean steam navigation in connection with the Panama Railway is becoming more remarkable from day to day. English and American lines are enlarging the number and improving the character of their steamers, and are bringing the Pacific ports of North and South America in close communicatian with ports on both sides of the Atlantic. A new English line, "The White Star," will place their first packet on the ocean in May. It is said that the French flag will also soon appear upon the Pacific.

Milk-pan Materials.

THE ordinary tin milk-pan, when new, is a cleanly utensil, but requires constant care to keep it in good condition, and when worn to the surface of the iron is likely to give a bad taste to the contents. The keeping of the crevices in the seams clear of fermenting caseine, etc., is also a matter of considerable trouble. In small dairies, scalding with hot water must remain the only popular mode of preventing mischief from this source; but in large ones, where expense can be afforded to secure better results, it would be well if an apparatus were so contrived as to throw a steam-jet forcibly against the inner surface of the pan. Zinc has been proposed as a material for milk-pans, but should never be used, because the lactic acid combines with the easily oxydized surface of the zinc to form a poisonous salt. Glass is the most innocuous and easily cleaned of all, but its fragile character and great first cost put it beyond the reach of most dairymen.—*Weekly Evening Mail.*

[The above is suggestive of certain improvements needed in the dairy business, one of the most extensive in the country, and likely to reward the inventor.—EDS.

JAGER'S PATENT CARRIAGE-COUPLING.

THE device represented in the accompanying engravings is designed to prevent the annoying rattling frequently experienced from the use of the coupling ordinarily used for connecting the thills or draught-pole of a carriage to its forward axle. Fig. 1 shows the device as attached to and arranged in suitable relation with the axle, and Fig. 2 is a separate view of that portion of the device the use of which constitutes the salient feature of the invention.

The clip, A, is clasped upon the axle in the usual manner, and is formed with two screw-shanks, one shown at *a*, which pass through holes in the broader side of the V-shaped strap, B, in such wise that the nuts, *b*, hold the said strap firmly in place upon the lower side of the axle, with its socket end, *i.e.*, that designed for the reception of the connecting bolt, projecting forward. It will be seen that the narrow side of the V-shaped strap is free or unconfined by the means used to secure the strap in place, and it should be mentioned that it is of a more or less elastic character in a lateral direction. The adjacent end of the thill has an appropriate socket-iron, C, through the holes in which, and of course through those, *c*, of the strap, B, the connecting-bolt, D, is passed, thereby connecting the whole properly together. The elastic part of the strap pressing laterally inward against the socket-iron, or being suitably adjusted thereto, insures that no space be afforded for the lateral movement of the socket iron upon the bolt, and thereby obviates the noise and rattling that would otherwise, as with the ordinary thill-coupling, be likely to occur, and to which reference has herein previously been made. This simple and convenient device was patented through the "American Artisan Patent Agency," Jan. 16, 1872, by Benj. W. Jager, of Hainesville, N. J.

Fig 1

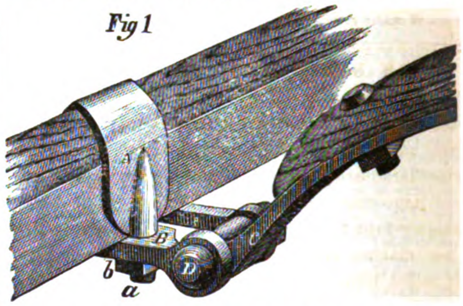
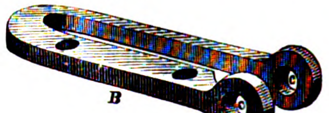


Fig. 2.



STONE FOR THE CITY HALL FOUNTAIN.—Several large blocks of polished Quincy granite, intended for the new fountain in the New York City Hall Park, were recently deposited on the site, and as soon as the weather moderates the stone-work will proceed. The main basin will be 30 feet square, and the four lunettes three feet in radius. The basin and fountain will be of light Quincy granite, with polished panels, and the principal shaft of dark granite, combined with Scotch granite. A second basin, ten feet in diameter, will be surrounded by a band of colored encaustic tiles. The whole will be supported by a terminal of standard bronze, gilded by the electro-plating process. At each of the four angles of the fountain will be a lamp having five lights, and standing on a pedestal of Scotch granite.

AMERICAN ARTISAN

BROWN, COOMBS & CO., Publishers.

ISSUED WEEKLY AT

No 189 Broadway, New York.

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WEDNESDAY, MARCH 20, 1872

IRON SHIPS FROM DENMARK.

Within a few days since, there have been lying at the wharf in New York City two iron vessels notable as being the first that, built in the shipyards of Denmark, have come to this port. Though not of large size, registering about eight hundred and eighty-four tuns each, they are fine examples of iron marine construction. One of them, the *Rolf*, sailed some days before her consort, the *Thorvaldsen*, to which latter we devoted an hour or two in the inspection of her machinery, etc., and a brief sketch of which may be, at least, of passing interest.

The *Thorvaldsen* is two hundred and twenty-eight feet long, thirty feet beam, and draws about sixteen feet when fully laden. Her engines, two in number, coupled direct to the propeller shaft, are of the inverted vertical compound variety, of sixty nominal horse-power each. The two boilers are return tubular, each fitted with two safety-valves, and conducting the steam, previous to its reaching the cylinders, through a superheater, heated by the waste gaseous products of combustion in the uptake common to the two. About fifty-five pounds pressure, we were told, is ordinarily carried, to give a speed of from eight to nine knots. The consumption of fuel is stated at a quite low figure, from two and one-half to three pounds per horse-power per hour. An eight horse-power donkey boiler works the three hoisting winches on deck, and also the donkey pump, by which the ballast tanks are filled, these latter holding about two hundred and sixty tuns of water, and requiring, in filling, about three hours' time. The main boilers are so connected with this donkey boiler that, when required, steam from the former may be run through the latter to work the winches and pump without firing up the donkey boiler—this, although a minor matter, aiding somewhat the convenience with which the working of the several apparatus can be carried on.

There are some items in the construction and management of the boiler which, although well known to steam engineers as desirable, are not as commonly adopted as they should be. For example, every rivet-hole in the boilers is drilled instead of punched, thereby securing strong joints and avoiding leaks. The fire-boxes, moreover, fitted into the cylindrical boiler shells, are accurately turned in a lathe, and held in position by riveting to firmly placed angle irons. Surface condensers are of course employed, but the fresh water from them has systematically mixed with it about seven ounces of sea or salt water to the gallon. This produces in the boilers, in the course of a transatlantic voyage, a scale about the one thirty-second of an inch thick, which is easily blown off on occasion, but which serves to protect the internal boiler surface from the corrosion that would otherwise occur from the copper salts dissolved in the water during its passage through the copper pipes of the condensers, etc.

The building of iron vessels in Denmark appears to have, all things considered, been pushed with commendable enterprise, the constructors of the *Rolf* and *Thorvaldsen* employing about eleven hundred operatives in their works. The first vessels of this character turned out in Copenhagen, the seat of the industry, were of about fifty tuns burthen, and designed for transit and trade to and fro between ports on the Baltic. This was about fifteen years ago. At present, ships of one thousand tuns register are under way. One vessel now in process of construction would seem to be quite a curiosity of its kind, being designed for laying a cable between China and Japan, and fitted with multiform contrivances for laying down and taking up submerged wires, for diving, and the like. Some others are also mentioned to us as not only of very superior speed, but of unusual finish in all that pertains to their construction; of such being the *Titania*, running between Copenhagen and Stettin, which is claimed to make fourteen knots an hour. This steamer is one hundred and fifty feet in length, and about twenty-five beam, and ten feet draught of water. She carries engines of the same power and character as those of the *Thorvaldsen*. The *Dania*, a passenger packet between Copenhagen and Aalborg, in Jutland, has an oscillating compound engine, the high-pressure cylinder placed within the larger or low-pressure one, and each provided with its own pair of slide-valves. This vessel is stated to make the distance between the two places, one hundred and four miles, in about eight hours. From this and other data brought to our notice, it is evident that the famous "little strip of land between the Baltic and the North Sea" is doing highly creditable work in this most important department of practical engineering.

BOILER-PLATE MAKERS AND THE STEAMBOAT LAW.

According to the *Iron Age*, the new steamboat law, which went into operation Feb. 28, 1872, is exciting much opposition from manufacturers of boiler-plates. The statute provides that all steam-generators for marine purposes shall be subjected to certain tests of its tensile strength, and be legibly stamped both by the manufacturer and by the United States inspector. This the producers choose to interpret as holding them responsible for the safety of boilers made from their material. For this reason, says our cotemporary, "the plate-makers will take no orders from the boiler-makers for iron to be used in marine boilers." The *Iron Age* follows suit by stigmatizing the law as a blunder, and stating that the stamps "would be practically worthless as a guarantee of strength in plates which are liable to deterioration after they leave the makers' hands." All of which seems to us ridiculous, for there is no reason why a boiler-plate should be exempt from tests to prove its fitness for use, any more than should a chain-cable, a railway-rail, or a steam-boiler after it is finished. Bad construction would, of course, cause explosions even if boilers were always made of the best plates; but this is no cause why the great source of danger existent in the use of poor material should not be avoided in every possible way. And the necessity of legislation on the subject will be apparent as long as so much of the boiler-sheet in market is notoriously made up of scrap imperfectly assorted, and subject, in the process of manufacture, to all the chances of imperfect welding.

But we do not see that the law is justly open to the criticism made upon it. Certainly, if a boiler explodes, it will be much more to the advantage of the party who rolled the plate if he can show that, when it went from its hands, it was capable of bearing, and actually did bear, a strain much greater than it could properly be called upon to sustain when in actual use. The *Iron Age* suggests that, if Congress honestly desires to diminish the mortality on steamboats, it can very easily accomplish that result by enacting, in the place of the present law, provisions making those owning and using boilers responsible for their safety. This is right, assuming that a boiler is properly put together and of suitable material when it is placed in a vessel, but under any other conditions it would simply make the owners of steam-vessels responsible for all the disasters that the cupidity of boiler-plate manufacturers or the carelessness of steam-boiler makers might bring to pass.

BAND-SAWS FOR CUTTING LARGE TIMBER.

The substitution of a band-saw—an endless serrated strip of steel running continuously over pulleys in one direction—for the old style of reciprocating gig-saw, produced in many kinds of wood-working a decided revolution in the greater speed with which the work could be performed. But few would suppose that the same principle could be adopted to advantage in sawing the large logs from American forests. This, however, has been done, and sawing machines constructed on this principle, capable of sawing stuff forty-eight feet in length, are for sale by firms located both in Philadelphia and London. We do not know that these have yet been used to an extent warranting the belief that they will prove more useful for ordinary saw-mill work, or for sawing timber which two circular saws, one above the other, are found capable of cutting into plank. But for various special purposes, like the shaping of ship timber and many others, this adaptation of the band-saw seems to possess much merit, and will doubtless meet with extended favor, and may possibly admit of modifications in its structure now unthought of.

As concerns the proportions of the machine as made for heavy sawing, we find the diameter of the wheels over which the saw passes stated at six feet. These wheels are of wrought-iron, and are tightened against the saw to a tension of from two and one-half to ten tuns, the uppermost wheel being vertically adjustable a distance of twenty inches, and having its shaft, four inches in diameter, of steel. The shaft of the lower wheel is of wrought-iron and is half an inch greater in diameter, and the journal-boxes of both are lined with hard brass. The log carriage is commonly made with especial reference to the variety of work for which the machine is designed, and of course varies according to circumstances. For resawing, feed-rolls are fitted to the apparatus. The production of large machines of this kind furnishes a good example of what may be done in extending the utility of an invention merely by the application of mechanical judgment without any exercise of what can be properly called inventive skill.

THE NEW YORK SOCIETY OF PRACTICAL ENGINEERING.

The stated monthly meeting of the New York Society of Practical Engineering took place on the evening of Wednesday, March 13, in the Geographical Rooms (Cooper Union), James A. Whitney in the chair. Valuable papers on "The Application of Electricity in the Regulation of Railway Traffic" and on "Steam Towage on Canals" were read by Mr. Frank L. Pope and Mr. D. D. Williamson, respectively. Both papers will, in due time, appear in full in our columns.

TO CORRESPONDENTS.

We wish our readers to understand that, in freely publishing communications, we do not hold ourselves responsible for the opinions of our correspondents, inasmuch as we may occasionally publish views opposed to our own.

Messrs. Editors:—A curious action that invariably results from the explosion of fulminating mercury (percussion-cap powder) I have never been able to account for. It is this, that nearly the whole force seems to be expended in a downward direction. I have seen two ounces (adulterated) exploded on a two-inch plank and shatter it, making a hole as if a shell had fallen on it, and smash the floor two foot ten below it.

If exploded on a platter placed on the cobble-stones of a road, it will drive the pieces down into the spaces between the stones, and many such instances might be mentioned.

For this I cannot account, the pressure of the atmosphere being equal in all directions; nor does it act like gunpowder, for it has exploded at a distance not further than two feet of another quantity without firing it. I would like Prof. Van der Weyde or some scientist to give us a reasonable explanation of this phenomenon, which to me is utterly inexplicable. Yours,

Machinist.

Tiffin, Ohio, March 5, 1872.

Messrs Editors:—The primary cause of the leakage in roofs is internal heat, warming the roof-boards on the upper part of the roof to a higher degree than the boards on the lower part—the difference between the apex and the eave in the attic being shown by the thermometer to be from six to eight degrees. Hence the snow melts from the apex and congeals as it descends to the eave, forming an ice-dam along the eave, which obstructs the passage of the water, and produces a reflux through the covering of the roof, of whatever material. Not only shingle or slate roofs but metal roofs are equally liable to this leakage, for the ice contracts the metal, and opens crevices for the water.

To prevent this effect, let the internal heat of the attic be raised at the eave, or diminished at the apex, or both, so as to equalize the temperature, or make it warmer at the eave than at the apex. The primary cause being thus removed, the effect ceases. The snow melts from the eave before it melts from the apex, and no ice-dam appears and no leak ensues. How equalize the internal heat of the attic so as to reverse the natural order of things? My (patent) process is to expose the outer covering of the roof at the eave to the internal heat, and protect the covering at the apex from the heat by a variety of mechanical devices, any one of which may be effectual, and all of which may be used together. For instance, open the joints between the roof-boards as you descend from the apex to the eave, taking care to have them perfectly close at the apex and on the upper part of the roof, and leaving an inch or two between the boards on the lower part; then a brick tile or metal tube should be laid under the outer covering on the lower part of the roof, warmed by the internal heat of the attic, or by tapping the flue of the chimney, or by a gas-burner or common lantern or lamp. The ice, if formed, will thus disappear in a few minutes, but, as a general rule, it will never appear. The skillful artisan must exercise his judgment in applying heat, for, as no two cases are precisely alike, no absolute rule can be specified for all cases. I have opened the joints of my roof on the lower part and closed them above, and then tapped my upper chambers by a ventilator placed over the gas-burners, thus throwing the heat directly under my eave in the attic, and the result is that the snow melts from the eave and disappears from the lower part of my roof before it melts from the upper part. My ventilator is merely a two-inch tin tube, flush with the ceiling of my upper chambers, and running through the floor into the attic about a foot from the wall, thus warming the bricks upon which the plate lies, and giving me a warm board and a warm brick to operate upon my eave and *eave-trough*. The leaky roof being thus disposed of, my process clears the eave-trough and conductor by *heat* derived from the attic and the basement, without which, although the roof would not leak, the trough fills with ice and overflows, and the conductor bursts, etc., etc.

The primary cause of this difficulty is that the mouth of the conductor gradually closes up when the weather suddenly changes from a thaw to a cold snap; the drip from the roof finds the coldest point at the mouth of the conductor, and freezes there first, then the water stagnates and rises up the conductor to the trough, and soon becomes a solid column of ice, rendering them both useless for the rest of the winter. Now, *heat the mouth* of the conductor from the basement story, and let the heat ascend to the trough, through a flue space formed by doubling the conductor, leaving an inch between them; let the air-conductor enter the cornice under the trough, and leave a channel for the air to pass under the trough to the upper end, where there should be an inch hole, to create a current of air, under the bottom of the eave-trough. Heat the conductor by admitting air from any warm chamber, or gas light, or lamp in the basement, into the elbow of the air-conductor, which is introduced through the apertures of the basement wall. If the building is very high, admit heat from each story from the gas-burner or from any warm chamber. Protect the mouth of the water-spout with a valve, which will exclude snow and cold air, and open for the passage of the water. The ice from sidewalks may be removed upon the same principle, and save life and limb. Heat a brick tile from your gas-burner in the basement, or if the basement is heated by a stove, etc., admit the air of the chamber into a tile laid underneath the sidewalk, and the snow-flake will be "one instant there, then gone for ever." Scarcely a day passes without accident from this nuisance of slippery sidewalks. The cost of preventing is a mere drop in the bucket compared with results. Respectfully,

Rutger B. Miller.

Italian Fire-proof Buildings.

Hiram Powers, the sculptor, writing from Florence to the Providence (R. I.) *Journal*, describes as follows the manner of constructing the fire-proof houses common in Italy. The plan would, doubtless, have to be modified before it could be extensively adopted here, but the sketch is both interesting and suggestive:—

"With regard to the thin arches built here for dwelling-houses. The builders first throw up all the walls without any flooring whatever. The walls are bound, when necessary, all around with iron rods, varying from an inch to an inch and a half diameter. Standing below and looking up, you at first might not perceive a slight recess in the walls at the point where the arch is to rest. It is about one and a half inches deep and two and a half inches high.

"When they are ready to begin the arch, a staging is made all around the room for the masons to stand on. They first of all make with plaster-of-paris a smooth place on the walls, on which to draw the curve intended for the arch. Of course, this curved line presents the appearance of a bow, the ends meeting at the base of the arch at each corner of the room. Bricks one foot long and six inches broad, and one and a half inches thick, well-burnt, but not so hard as to absorb water, are brought, and plaster-of-paris instead of mortar to lay them with. The masons now stretch small cords across from corner to corner of each wall, the ends fastened six inches distant from the latter, and on the curve of the arch. They then, with trowel and brush, mix upon their boards a small quantity of plaster to the consistency of mortar, and each, taking a brick, applies the plaster to one end and one side of it, and instantly places it in position, where it is held for a moment to allow the brick, by absorbing the water, so to thicken and stiffen the plaster as to hold the brick in its place.

"They then take another, placing it against the wall and the first brick, and so they go on until the four masons have projected their arch six inches out into the space, and inclined upward according to the curve of the arch. The masons now stretch their cords on the curve of the arch; another six inches out, and so they go on until some support is required, which is obtained by placing four rafters from the center of each wall and all meeting in the middle of the space, so as not to project above the highest part of the arch. They then place a brick or two on each of these rafters endwise, until they touch both rafter and arch; a little plaster-of-paris is used to stay the bricks. This done, they go on again until the arch is completed. But note—where the bricks meet at the corners, they pass one another a little at every alternate row, so as to make a serrated junction. This makes the corners stronger than anywhere else. When the arch is done, it is nowhere more than an inch and a half thick, but you can safely walk upon it, and it sounds like a drum. The uppermost or garret vaults are usually stiffened with braces of bricks from the walls toward the middle. These vaults have no flooring upon them.

"The vaults done, we now want to fill up the spaces and lay the tile floors. The first we do with a number of small arches, deep at the walls, but coming to nothing as they approach the center. These serve a double purpose—they brace and stiffen the arch, and also fill up the spaces, until, by using old wall rubbish, which is lighter than sand, the ground for the brick flooring is prepared, which flooring is laid not with plaster-

of-paris, but with mortar. Thus this thin arch is honeycombed, as it were, for lightness, and it is so strong that a room twenty-five feet square is quite safe for a dancing party. But it is important that you have good mortar for your walls, much lime, and little sand; the mortar should become as hard as the bricks. I have seen mortar in walls of six years' standing, in Cincinnati, that I could dig out with my nails. This is not the wall for any kind of arch to rest on and against. Observe that the curves of the little arches on top of the main arch run counter to the curve of the main arch.

"I still think that if several builders could club together, it would be well to send out here for a mason who fully understands the matter. I have been told that there are arches of this description at Volterra which have stood certainly several thousand years. They are in the tombs of that very ancient city, and the arch is called 'The Volterrano.' I have seen these arches without any plaster on them, the bricks so laid as to present a beautiful mosaic appearance. The cost of them is very small, as you must have perceived from the above description, and they are so light as to require no very great thickness of outer wall."

Treatment of Oils.

We note among the latest English patents two or three treatments of oils for industrial uses, which, presumably, are new in this country. One of these relates to consolidating and solidifying oils for the fabrication of floor-cloths, etc. In the apparatus used, a circular oil-tank or receiver (having a conical-shaped lid, the apex of which has an opening) has arranged within it a perforated tube, connected to a pipe leading to a second receiver, for the drying ingredients (sulphate of copper, sulphate of zinc, or sugar of lead, previously calcined and pulverized), which has a cover with small opening, and a lid. The powder is forced from the second receiver in and among the oil by a fan, at a high pressure, thoroughly amalgamating them and producing a solidifying effect. The solidified oil is then passed through rollers, and has pulverized litharge sifted over it. Any suitable pigment may be added. For floor-cloths, the product in a pug-mill or other masticator is, with a quantity of pulverized leather, cork-dust, saw-dust, or pulverized peat, thoroughly mixed, spread afterwards on a continuous sheet, and passed through rollers. When required of a harder nature, sulphur is mixed with it, and, when molded into the required form, it is submitted to heat. For covering telegraph-wires, the material is made of the same consistency as for floor-cloths, and is put on the wire by forcing it through a die, in a manner analagous to that in ordinary use for like purposes with other compounds.

The other alleged improvement refers to the treatment both of mineral and other oils by means of an apparatus comprising a connected series of vessels employed for effecting the proper mixing of usual acid with the oil; and into the first of these the acid and oil are led continuously in suitable proportions by a funnel or pipe entering at or dipping down to the bottom of the vessel. The mixture overflows from the first vessel by a pipe or funnel leading to the bottom of the second, and similarly to the other in succession. In each vessel an agitator insures the thorough intermixing of the acid and oil. From the mixing vessel or from the last, in a series, the mixture overflows into a depositing tank, divided by vertical transverse partitions extending close down to the bottom. The intermediate partitions are by preference set nearer the entering sides of each compartment, and the mixture, descending through the narrower space thus formed, rises up the wider space, and overflows from compartment to compartment in succession. Whilst the mixture flows through the compartments, the tarry matter and acid separate from the oil, and portions descend to the bottoms of the several compartments, whence they are drawn off by pipes. The same apparatus is used for treating the oil with alkali or for washing it.

Compressed Air in Mines.

According to a German correspondent of *Engineering*, an extensive use of compressed air begins to be made in Continental mines, chiefly for boring machines, coal-cutting machines, for raising stuff, and for lifting water. The mines of Westphalia, Friedrich, Wilhelm, and Tremonia have since then introduced the Sachse boring machine for sinking shafts and winzes. These machines are built and provided with air-compressing machinery by the Humboldt Engine-works, formerly Sievers & Co., at Kalk, near Cologne—a firm which, during fifteen years, has almost exclusively produced machinery for the purposes of mining, smelting, dressing ore, salt, phosphorite, etc. Coal-cutting machines, such as Firth's and others, are gradually finding their way to our collieries. At some pits of the Wuron District, near Aix-la-Chapelle, compressed air is occasionally used for raising water, and the contrivance is exceedingly simple. It consists of a closed iron cylinder about 5 feet high and 2½ feet diameter, which is provided with a valve at the bottom, and placed on the bottom of the shaft. Through the top goes a pipe from the surface to near the bottom valve, and there are besides one inlet and one outlet pipe for the compressed air connected with the cylinder. When this is filled with water through the bottom valve, air is admitted, which presses the water in the first-mentioned pipe upwards through a common pump-valve; then the air is allowed to escape by the outlet, when instantly the cylinder fills again with water, and the compressed air is turned on anew. This exceedingly simple machine is very useful, though not very economical, as compressed air is still rather expensive; however, one such machine requires only one man to handle it. It does at the mines of the Wuron the work of fifteen men employed on hand-pumps.

Removing Old Paint.

Resolvents are not resorted to to any great extent by carriage-painters in the removal of old paint. Doubtless, the majority of painters have experimented with chemical mixtures claiming to be a great improvement over the old plan of softening the paint by heat, but we think our experience will agree with others in this, that, while a chemical mixture may perform its work well and speedily, in so far as dissolving the paint is concerned, it also goes further and attacks the wood, leaving it in a furzy and gummy condition, on which it is difficult to get paint to dry firmly. House-painters use *chemical burners* to but a limited extent. Although their work is not required to be so perfect as that of the coach-maker, at least in Philadelphia such is the case. The charcoal furnace appears to be the favorite means with them of laying bare the wood, and when properly made it certainly performs its part well. The furnace is simple in construction, being nothing more than a small sheet-iron box with a handle. One person can do the work, but generally two persons are employed, one to hold the furnace, and another, who is skillful with the chisel or knife, to remove the paint and regulate the distance to which the furnace shall be held from the paint, an important item, for when the body of old paint becomes very hot it vitrifies, and when again it becomes cold it clings with greater tenacity than before it was heated. The furnace would be the most economical device in a shop not supplied with gas. But shops lighted with gas can have nothing more economical, speedy, and free from deleterious effects than that of a gas-jet. All that is required are a few yards of rubber tubing, arranged to suit one of the gas pendants. The tube can be held in the left hand, and the knife or chisel in the right. The jet or flame is then made to strike the surface, and, when the paint is warmed through, the knife is used quickly in removing it. The gas-jet does not give out a great amount of heat, and therefore does not injure the joints of the body, or draw out the oil from the wood to an extent that delays the after painting. In removing paint, the heat should never be so intense as to quickly raise it up into blisters, it is only necessary to warm it through.—*Coach-makers' International Journal.*

METAL MARKET.

[*Corrected weekly for the "American Artisan."*]

New York City, Saturday, Mar. 16, 1872.

IRON.

Pig, Scotch, No. 1 (cash), per ton	$33 00	@	35 00
do. American, No. 1 (cash)	35 00	@	36 00
do. do. No. 2	33 00	@	34 00
Swedish, ordinary sizes	105 00	@	120 00
Common	72 50	@	77 50
Refined	77 50	@	85 00
Rods	82 50	@	120 00
Horse-shoe	95 00	@	— —
Hoop	100 00	@	145 00
Scroll	100 00	@	125 00
Nail-rods, per lb	— 6¾	@	— —
Spring	— 7⅜	@	— —
Tire	— 7½	@	8 —

STEEL.

Bars, best cast, warranted, per lb	— 18	@	— 19½
Sheet, do	— 16	@	— —
do. second quality	— 15½	@	— —
do. third quality	— 12	@	— —
Saw-plates, circular	— 20	@	— 30
Double-shear, warranted	— 18	@	— —
Single do	— —	@	— —
Montague & Co. (cast bars)	— 15½	@	— —
Machinery, round	— 11	@	— 13
German, best	— 11	@	— —
do. goat	— 10	@	— —
do. eagle	— 9	@	— —
Blister, warranted	— 14	@	— —
do. common	— 10	@	— —
Jessop & Sons', common	— 17	@	— —
Double-refined	— 26½	@	— —
Stone-ax shapes	— 26½	@	— —

ZINC.

Mussulman and American, per lb	6½	@	— 9
Solder, per lb	— 22	@	— 23
Antimony	— 16	@	— 17
Spelter	— 7	@	— 7½
Copper, old	— 17	@	——
Brass, do	— 14	@	— —
Nails, roofing, per keg	7 50	@	— —
do. do. tinned	12 50	@	— —

LEAD.

American, per 100 lbs	7 50	@	8 00
German	7 50	@	8 00
Bar	8 50	@	9 00
Pipe and Sheet	8 50	@	9 00

NEW AMERICAN PATENTS.

We give, as follows, notices of some of the most interesting inventions for which Letters-Patent of the United States have recently been issued :—

Manufacture of Window-glass.—C. F. Carstens and T. H. Schwencke, Chicago, Ill.—*March* 5.—This novel process relates to forming concavo-convex window-glass, with its edges all in the same plane, and with its smoothness and transparency unaffected by coming in contact with any molding surface, by means of an open metallic frame.

Manufacture of Paper Pulp.—G. De Mailly, Argenteuil, France.—*March* 5.—In the operation of this invention is employed a rotary grooved cylinder with grooved blades, india-rubbers for the distribution of pressure, iron checks and guides to suitably arranged grooved plates, and a novel chemical process for preparing the filaments before subjecting them to the action of the machine.

Manufacture of Hard Sugar.—J. O. Donner, Williamsburg, N. Y., and S. S. Hepworth, Yonkers, N. Y.—*March* 5.—This comprises the preparation of hard sugar in a centrifugal machine by the use of a magma consisting of a saturated solution of sugar at a higher temperature mixed with crystals of sugar at a lower temperature. Also, the preparation of hard sugar in a centrifugal machine, by passing a saturated solution of sugar at a higher temperature through soft sugar already formed in the machine at a lower temperature. Also, an interior removable frame used in combination with the basket of a centrifugal machine.

Stove Platform.—W. Westlake, Chicago, Ill. —*March* 5.—This platform for stoves consists of a metal covering and a wood interior. The corners are made by first spinning a disk of metal to the required shape, and then cutting the same into four pieces, each to cover one corner.

Gas-retort.—J. Butler, New York City.—*March* 5.—This improved gas-retort is composed of an outer retort and basket, between which is an annular space, the basket having a perforated bottom, whereby the gas and vapors are made to permeate the mass of heated coal in its course to the gasometer.

Iron Shutter and Door.—J. W. Hoyt, Springfield, Mass.—*March* 5.—This improved iron door is constituted by two or more sheets of corrugated iron placed together, with their corrugations extending at right angles to each other, and inclosed at their edges by a channel iron, the whole firmly secured together by bolts or rivets.

Apparatus for dyeing Yarn.—T. Sheard, Little Falls, N. Y.—*March* 5.—This inventor claims the use of two or more sets of clamps used successively, the second applied before the first is removed, so that the threads of yarn or fabrics may be held in exactly the same relative position, while the other part is inserted in the second dye-kettle or vat. Also, the use of blocks of wood, rubber, or other material, by means of which the dye is prevented from entering the ends of the clamps and coloring the yarn higher than is desired. Also, a peculiar form given to the clamps, whereby the lower edge, when the yarn is compressed, is dropped below the top of the kettle or vat and immersed in the dye, while it is kept in the same position by resting the handles upon the edge of the kettle or vat, and the greater weight of the lower edge of the clamps keeps them in that position and immersed in the dye without causing the dye to overflow.

Feeder for Pegging Machines.—G. M. Cram, Rindge, N. H.—*March* 5.—This improvement includes the combination of a feed-wheel, arranged to engage with the side of a strip of wood, a driving spring with connecting gearing, and a channeled feed-box. Also, the combination with a spring peg-feeder of a stop-pawl, arranged to engage either with the strip of peg wood when in position or with the driving mechanism.

Machine for sewing Boots and Shoes.—C. O. Crosby, Milford, Conn.—*March* 5.—The essential features of this improvement are found in the combination of a needle carrying one thread, a race, and a shuttle carrying a second thread, so arranged that the shuttle moves in a path diagonal to that of the needle. Also, the combination with a needle, race, and shuttle, arranged as just specified, of a cam or its equivalent for operating the shuttle. Also, the arrangement of a lubricating device in connection with the shuttle-race, so that the point of the needle will receive the lubrication.

Glass Press.—H. J. Leasure, Wheeling, West Va.—*March* 5.—The gist of this invention is found in the combination with a glass press of a system of blow-pipes, two or more in number, attached to the frame or non-moving part of the press as a permanent part thereof, and having air-discharge openings opposite to each other and opposite to the plunger or other part that is to be cooled. The claim also covers the system of pipes described, adjustably attached to the framework or other non-moving part of a glass press, so as to bring the air-discharge openings opposite to the part to be cooled.

Three-high Rolls.—J. Moore, Philadelphia, and J. Fritz, Bethlehem, Pa.—*March* 5.—In this apparatus a pillar is arranged between the top bearing and the screw, of such length that, when removed, the bearing can be elevated sufficiently to permit the withdrawal of the roll. There is also claimed the combination in a rolling mill of a screw for adjusting the roll-bearings and a cap fitted to the nut or to an attachment thereto, so as to rise or fall with the screw without exposing any portion of the latter. Certain other novel arrangements of parts adjunctive to the above are also included in the invention.

Chalk-holder for Billiard-tables.—G. W. Morris, Minonk, Ill.—*March* 5.—This novel chalk-holder for billiard-tables consists of a rubber or elastic stock or holder, whose socket being elastic will hold the chalk without any additional device for the purpose. The invention also consists in the combination of the peculiarly constructed holder with a novel means of attaching it to the sustaining cord.

Egg-beater.—D. Munson, Indianapolis, Ind.—*March* 5; ante-dated *Feb.* 28.—This is a spoon-shaped egg-beater formed of solid separate curved strands, or a continuous bent or curved wire having three or more sharp edges and flat surfaces, the device constituting a new and improved article of manufacture.

Railway Stock-car.—S. W. Remer, Taunton, Mass.—*March* 5.—The most noticeable feature of this invention lies in the use of transverse partitions carrying suitably arranged troughs united by horizontal hinged joints with the upper part of the car or some fixed part thereof, and arranged at such fixed distances apart that any one partition may be swung up to the roof without interference with or requiring the movement of the other partitions.

Cooking-stove and Range.—J. J. Richardson, Brooklyn, N. Y.—*March* 5.—The peculiar characteristics of this improved stove involve the use of openings forming a communication from the lower part of the oven to the base of the fire, and provided with a register or draught door, in combination with appliances for admitting heated fresh air into the upper part of the oven.

Lubricator for Steam-engines.—S. E. Whitney, Canaseraga, N. Y.—*March* 5.—Aside from certain minor combinations of parts, the essential features of this invention are found in the employment of a fluted valve-spindle for facilitating the passage of oil from the bowl to the oil chamber. Also, in a steam-cylinder oiler so constructed as to feed the oil either from the top or bottom of the oil chamber, at the option of the operator.

Toilet Brush.—A. Wilder, Hingham, Mass.—*March* 5.—This new article of manufacture is a toilet brush composed of a recessed backing and a bristle-block accurately fitted therein, both made of cement plastic under thermal influences, and having the bristles wired into the bristle-block when united by liquid cement or solvent.

Screw-cutting Machine.–Benjamin L. Walker, New York City.—*March* 12.—This invention consists, firstly, in a novel construction of bolt-holder, including a sliding-clamp, spiral or cam-shaped operating lever, and an adjusting screw for manipulating the holder with facility and dispatch to establish its hold or release of the bolt, and for quickly adapting the holder to the bolts of recognized different sizes or of nominally the same diameter but varying slightly in size. Furthermore is provided the die-holder with a removable cone in its back, through which the screw that adapts the holder to different thicknesses of bolt-heads is projected, and whereby, on taking out the cone, which is free from jamming or slipping, provision is made for introducing a bolt of any desired length through the holder to the dies. The invention also includes the arrangement of the dies in peculiarly constructed die-holders within the stocks, whereby the dies may be utilized by recutting till worn out or nearly so, and yet a fair and sufficient hold be obtained for them. Provision likewise is made for the lateral adjustment of the dies, whereby, if unequally tempered, the work may be thrown more on one side than the other, and the thread may be brought up on bolts of diminished size, likewise whereby the dies are securely held in position. Furthermore, the invention consists in a combination with a screw-cutting machine of an oil pump worked from the mandrel which rotates the dies, and serving to lubricate the latter as required.

Water and Sewer Pipe.—James S. Pierson, New York City.—*March* 12.—This invention consists in a corrugated sheet-metal pipe lined with hydraulic cement on its interior and coated externally with asphalt or other waterproof material to protect it from corrosion on the outside, while the hydraulic cement not only protects the sheet-metal from corrosion internally, but gives a smooth or clear finish to the interior, and is not liable to be eaten away by acids or otherwise injured by chemical action, and imparts no obnoxious flavor to the water or fluid passing through the pipe. The corrugations of the sheet-metal body are annularly arranged, and, in addition to imparting strength and relieving the rivets which secure the same of strain, serve to hold the lining of hydraulic cement to its place. A pipe thus made is at once cheap, light, and capable of sustaining a very heavy pressure.

Safety Hoisting Apparatus.—James W. Osgood, New York City.—*March* 12.—This invention consists in a combination with a hinged hatch, or pair of half-doors forming a single hatch to each floor, of mechanism connected with the hinged portion of the hatches, for effecting a gradual lowering of the hatches after the cab or platform has passed up through, and for opening said hatches in the descent of the cab or platform, both movements being effected by the action of the latter through the intervention of levers connected with said mechanism. The hatches are opened during the ascent of the cab in a gradual and easy manner by curved lifters attached to the cab or platform, which lifters also serve to gradually lower the hatches after the cab, in its descent, passes them. Furthermore, the invention consists in a combination with each hinged half or portion of the hatch of sectional racks or ratchets arranged on the under-side of the hatch, and so that, on the latter being opened or raised, said racks form continuations of the safety racks ordinarily employed up the sides of a hatchway for safety pawls applied to the cab or platform to bite into in case of accident or derangement of the hoisting rope. The invention also comprises a hatch formed of two hinged portions divided diagonally in relation with the hinges, to provide for a close fit of the hatch with the uprights or guides of the hatchway, when said guides are arranged opposite the angles or corners of the cab, as in hatchways situated in proximity to two adjacent walls of a building, and under other circumstances.

Heaters for evaporating Liquids and other Substances.—Benjamin T. Babbitt, New York City.—*March* 12.—This invention consists in a tubular device of novel construction, designed to be placed as an appendage within pots or other vessels, the contents of which require to be heated or evaporated, and which is effected by steam, hot water, or air made to circulate through said device.

Cask or Barrel.—John Marshall, Brooklyn N. Y.—*March* 12.—This invention is similar in certain of its features, and has for the most part like objects in view to the wood-cased metal cask or barrel, for which letters-patents were issued to the same inventor on the 18th day of July, 1871, but it essentially differs therefrom in the construction of the metallic body, which is made up of two or more longitudinal sections, instead of two transverse sections united at the bilge, the same, however, being combined with metal ends of a flattened concave form, so that when wooden heads are inserted between the projecting ends of

the staves that compose the casing, air-spaces are formed around the outside portions of the metal ends that, combined with the shape of said ends, allow for the flexing of the latter, to provide for expansion and contraction of the contents of the cask or barrel, making the latter more solid when full, and less liable to burst or break—said cask or barrel also providing against leakage, and being both capacious and durable. By making the metallic portion of the body in longitudinal sections, the inventor is enabled to make a cask or barrel with a more perfect bilge, and dispense with a seam, as compared with a wooden-cased metal cask or barrel, the metallic body of which is composed of transverse sections meeting at the bilge, and each of these formed of longitudinal sections.

CAR-BRAKE.—J. Wiley Jacobs, Jeffersonville, Ind.—*March* 12.—This invention relates to brake-wheels provided distinct from the running wheels on the same axle therewith; and it consists in a novel construction of such brake-wheels, whereby their rims or peripheries, against which the brake-shoes operate, may be easily renewed when worn out.

WHEEL—James Davis, Long Island City, N. Y. —*March* 12.—This invention consists in a novel construction of the hub, whereby the spokes are very firmly secured within it, and it may be adjusted to clamp and tighten them after shrinkage, and convenient provision is made for the insertion of a new spoke should one be broken. It also consists in a hollow felly of novel construction, having a concave periphery on which the tire is shrunk, and thereby secured without the use of bolts or rivets, the holes for the reception of which considerably weaken the tire.

TRICK TOY.—Joseph M. Hartz, New York City. —*March* 12.—This invention consists in the novel construction of a box and arrangement of bon-bons or other articles therein, whereby a less or greater number of such articles may be exhibited by opening the box, or, in other words, a certain number of them may be made to appear, disappear, and reappear, by opening, closing, and re-opening the box.

MEANS OF PROPELLING CARS.—A. R. Crihfield, Lincoln, Ill.—*March* 12.—This invention consists in a stationary pipe arranged between the rails, and flexible pipes or sections connected with it, and supplying compressed air to engines on the car whereby its propulsion is effected, and a revolving drum on its under-side, operated as the car moves on, and made to wind up one of the flexible sections till its connection with the main pipe is reached, when, by a reversal of gear, the unwinding of said section is effected, after which the same operation is repeated with the next flexible section, and thus compressed air is supplied to the car while in motion from stationary reservoirs arranged between the tracks.

Practical Steam-making Power of Coal.

THE service of a tun of coal on the Hannibal and St. Joseph Railroad, on an average freight train, is 43 and 4-10ths miles. On the same road, passenger trains run 59 and 6-10ths miles per tun of coal. The Illinois Central Railroad gives 37 miles as the average service for a tun of coal. This road, in its estimates for 1869, however, gives 55 miles per tun of coal as the highest performance. It also estimates wood at 2 and 2-5ths the cost of coal; this result is based upon the cost of wood at $5 81 per cord, and coal at $2 10 per tun, in Illinois, while on the Iowa division wood is reckoned at $9 62 per cord, and coal at $3 28 per tun. Statements from the Kansas Pacific Railroad give an average of 50 miles for passenger trains per tun of coal. Passenger trains on the Missouri River, Fort Scott, and Gulf Railroads have made 85 miles per tun of coal.

On the Burlington and Missouri River Railroad an engine, hauling 16 freight cars, ran 44 and 7-10ths miles, and a passenger train of three cars ran 59 and 7-10ths miles per tun of coal, while the average service is 37·74 miles. The Chicago, Burlington, and Quincy Railroad averages 48 and 4-10ths miles per tun of coal. The best service was 100 miles per tun of coal. The Pennsylvania Company gives 49·11 miles, its best service being 98 miles per tun of coal.

The expression of power in numbers for the service of coal on railroads must always be variable. The kind of fire-box used, whether close or perforated, the intelligence of the stokers or firemen, and the quality and condition of the coal, are elements which will prevent a general uniformity of results. But when the fact is understood and appreciated that a loss of 400 to 600 pounds per tun accompanies imperfect combustion, railway managers as well as common consumers will be eager to save such an item by a studious application of the best methods.—*Prairie Farmer*.

Manufacture of Alloys.

AN eminent authority gives the following as reliable directions for the most successful manufacture of alloys:—

"1. Heat the crucible to a red or sometimes a white heat, and then melt the *least* fusible of the metals composing the alloy. After fusion, heat this metal to such a heat that it will bear the addition of the next least fusible metal without too great a reduction of temperature.

"2. Introduce the metals into the pot strictly in the order of their resistance to fusion, each metal being properly melted before the next is added. The danger in first melting one of the most fusible metals lies in the fact that it would most probably volatilize and become oxydized; this would be a source of great waste.

"3. Heat each charge of metal thoroughly before adding it to the pot, thus avoiding as far as possible the reduction of the temperature of the metal in the crucible.

"4. When the proportion of zinc is large, and some of the component metals have a high point of fusion, the alloys should be covered with a layer of charcoal dust. If the alloys are rich in tin, the surface of the melted metal should be covered with sand.

"5. Stir the metal before casting, and if possible when casting, with a white-wood stick; this is much preferable for the purpose to iron.

"6. If possible, add a small proportion of old alloy to the new one. If the alloy is required to make sharp castings, and strength is not a very great object, this proportion of old alloy to the new should be increased. In all cases, a new or thoroughly well-cleaned crucible should be used."

Ore-concentrating Machinery.

THE Reese River *Reveille* has the following sketch of a new ore-concentrator, and the machinery used in connection therewith in working "old waste dump," largely mixed with granite or clay, and averaging about $25 per tun as it lies. From this comparatively worthless grade of ore three tuns are reduced to about one tun of pulp, assaying fully $60, the residue assaying about $5 per tun. The $60 pulp is then further reduced by water to an amount assaying at the rate of $150.

The process is simple. The rock, after being thoroughly dried in the kiln, is fed into the crusher, whence, by means of a spout, it is conducted to the upper end of a revolving screen. The pulp passes through a fine screen, while the waste passes through a coarse screen. The pieces of rock too large to pass through either are discharged at the lower open end.

The rock discharged through the end of the screen is carried by an elevator back to and passed through the crusher and screen. By these means low-grade ores, which have heretofore been worthless on account of the cost of milling, can be worked at a profit. The expense of running the works are: one engineer, one man to feed the crusher, one man to tend the drying-kiln, and one cord of wood per day. The capacity of the apparatus will probably be considered over twenty tuns for a working day of ten hours. The principle of working this exceedingly cheap and simple apparatus is this:—Mineral-bearing rock is friable at those parts containing the mineral—therefore it is the more easily fractured at that point. The crusher has both a crushing and a grinding motion; the rock, being broken into small pieces, exposes its mineral surfaces, which, grinding against each other, is disintegrated from the gangue; and, being in fine particles, is passed through the screen in the form of pulp. It is then further concentrated by means of water, the fine particles of granite, quartz, and sand being washed off.

New Invention.

THE Girard (Pa.) *Cosmopolite* says that, at a certain station on the Philadelphia and Erie Railroad, the company has a new night telegraph operator who, if inclined to slumber, is too ingeniously wide-awake to be caught napping at his post. Recently he was seized with drowsiness, which he could not shake off. As it was his duty to report all passing he dared not yield, and yet could not resist. Necessity at length suggested an alarm signal, which he proceeded to put in operation by suspending a scuttle full of coal by means of a cord which was passed through the key-hole of his office door, and fastened across the track at the requisite elevation. He then resigned himself to rosy dreams, which were interrupted by a passing train, the engine of which snapped the cord, causing the coal-scuttle to come down with a noise that effectually roused him to his duty.

The Westfield: A Righteous Verdict.

THE attorneys of Mrs. Jane Madden, who recovered a verdict of $5,000 on Saturday, March 9, for the death of her husband by the explosion of the ferry-boat *Westfield*, entered judgment in the case for $5,681. An execution was immediately issued on this judgment to the Sheriff of the County of New York, on the 11th inst., who detailed three deputies, and the *Westfield* was attached on its arrival at the Whitehall wharf. The boat was left in charge of the Sheriff until the judgment in favor of Mrs. Madden should be paid. The Company can pay into Court the full amount of the execution, execute a bond in double the amount of the judgment, to be paid if an appeal should be decided against the Company, or allow the *Westfield* to be sold to satisfy the execution.

Substitute for Curled Hair.

THE curling of "soap-root" as a substitute for hair mattresses is quite an industry in California. It employs a capital of nearly $50,000, with sixty men, and machinery and engine of 40 horse-power. The value of the product is nearly $100,000 annually, and is steadily increasing, because this material is the best substitue for hair ever discovered, and grows in unlimited quantities in all the foot-hill districts of the State.

PROSPECTUS

OF THE

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VOL. XIV. NEW SERIES. 1872.

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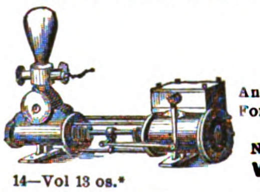

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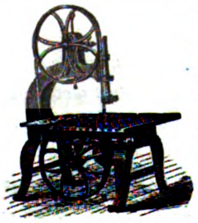

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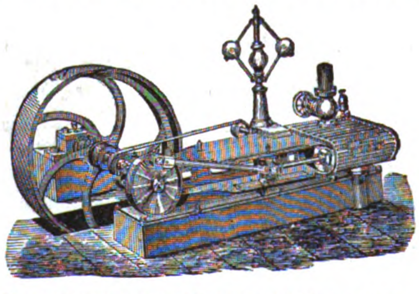

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CONTENTS OF THIS NUMBER

[Illustrations are indicated by an asterisk.]

The "Southwestern Exposition" Building.

Nothing shows the recuperative energy of the Southern people more than does the revival of industries manifest within their borders, this revival being accompanied by the use of machinery and processes formerly wholly unknown, and in many cases especially designed to meet the exigencies of Southern tillage and manufactures. Improved apparatus, such as cotton-seed planters, and many other implements, are now common, where formerly hand-labor was universal, and the inventive genius of the South—although under the old *régime* it slumbered until its very existence was doubted—is now grappling with some of the most important and intricate of industrial problems, as, for example, in the various attempts to produce mechanism that will enable cotton to be harvested by steam-power, and in the increased growth of special products like indigo and madder. It is also noteworthy that the only steam-plowing apparatus in successful operation in the United States, is on a Louisiana plantation. Illustrative of the same progress is the growth of the production of oil from cotton-seed, which has been wholly developed since the war, and which has already added a very important item to the agricultural and manufacturing resources of all the cotton-growing States. We might expand the list by reference to the varied mineral riches of the region under consideration, but this is enough to show the why and wherefore of our belief, expressed on several previous occasions, that improved arts, industries, tillage, indeed all that goes toward building up thriving, powerful, and productive communities, are destined to a brighter future in the South than even her most devoted adherents would have dared to hope a few years ago. In this, of course, all the aids employed in the North and among the nations of Europe to bring about like results must be availed of, and among such well-conducted fairs or expositions must find a prominent place.

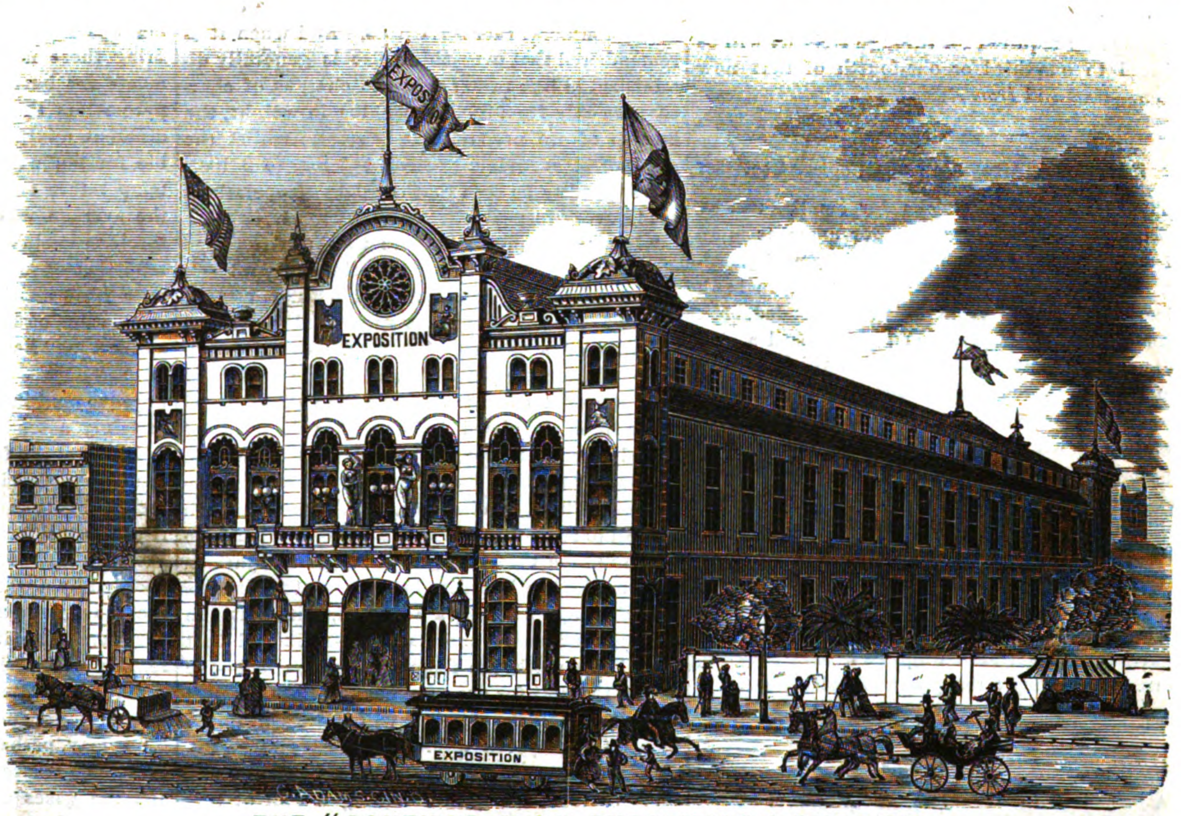
Our engraving represents the building of the Southwestern Exposition Association, designed for the Grand Industrial Exposition to be held in New Orleans from the 1st to the 22d day of May next. The structure, of brick, with slate roof, fronts on both Carondelet and St. Charles Streets (extending through the entire square), and is eighty-five feet wide by three hundred and forty-one feet in length.

The first floor (Power Hall), having large entrances on both St. Charles and Carondelet Streets, is eighty feet wide by three hundred and forty-one feet long and twenty feet ceiling, and will contain all kinds of machinery in operation or stationary, agricultural implements, wagons, carriages, safes, and other heavy goods. Lines of shafting will traverse this hall from end to end, driven by a powerful double walking-beam engine, especially built for this Association.

On the second floor is located the Fine Art Hall, which will contain, in addition to paintings, statuary, etc., house goods of all kinds, sewing-machines, musical instruments, stoves, ranges, glass cases, models, and samples of general manufactured merchandise. This hall is eighty feet wide, one hundred and seventy feet long, with a twenty-feet ceiling, and will be handsomely finished.

Adjoining the Fine Art Hall is the Grand Concert Hall, which is the largest in the South, being one hundred and seventy feet long, eighty-one feet wide, and thirty-eight feet ceiling, with large supper rooms, vestibules, parlors, cloak-rooms, etc., all handsomely furnished and decorated. This hall will be used in connection with the Exposition when necessary.

The twenty days' Exposition above alluded to is intended as introductory to a permanent exposition, to be opened ten days after the close of the preliminary or opening one, and in which the space in the buildings will be let at stated prices per foot to inventors, manufacturers, etc., for the purpose of showing their wares. Desk-room will also be rented to enable exhibitors to make sales and attend to business transactions in convenient proximity to the wares shown by them. Parties wishing any further information concerning either the opening or the permanent exhibition can obtain pamphlets containing rules and regulations and all other desirable data, and also blank applications for space, by addressing "The Southwestern Exposition Association," New Orleans, La. It may be noted, in conclusion, that parties exhibiting



THE "SOUTHWESTERN EXPOSITION" BUILDING.

wares during the opening will be charged nothing for the space occupied; the entry fee, two dollars, not only covering all charges of this kind, but also insuring admission tickets, good at all hours during which the Fair is open.

Iron Canal-boat.

THE first iron canal-boat ever made in this country, or in the world, is now being built at the Continental Works, Green Point, N. Y. The dimensions are as follows:

Length, 97 feet; beam 17 feet 6 inches; depth, extreme, 9 feet 4 inches; depth of hold, 7 feet 10 inches; space of water-bottom, 1 foot 6 inches. This boat is constructed of iron, on what is known as the longitudinal and transverse plan, with water-bottom divided by the framing into water-tight compartments. She has three entire bulkheads, dividing the machinery, cargo, and cabin spaces from each other. The boat is especially designed to carry grain, and has a cargo capacity of 6,666 bushels, or 200 tuns of wheat. The boat is being built for the Fowler Improved Steam Propeller Co., and is especially designed for the improved screw of this company, which is to be driven by an engine, 12 inches diameter of cylinder, and 20-inch stroke of piston. The boiler is expected to carry 100 lbs. of steam as a working pressure.

From the peculiar advantages of the Fowler wheel for canal navigation, and the lightness and strength of this boat, the vexed problem of how to carry a paying freight at a fair rate of speed upon our canals will undoubtedly be solved, and the time *now* required for through freights will be reduced to one-third or one-fourth of that now taken.—*Coal and Iron Record.*

Preventing Alteration of Checks, Etc.

THE "raising" of checks for small sums by altering them to represent larger amounts is an old and, in many cases, successful form of rascality. To prevent this and thereby secure bank officers and others from being defrauded, Mr. John Gibson, of Albany, N. Y., has devised a simple and, it is claimed, efficient means, which consists in perforating through the paper the amount in figures for which the check or other paper is drawn, in combination with a blocking star or other peculiar distinctive character (also perforated), placed before and after the perforated amount to prevent the addition of other figures for fraudulent purposes.

This method of perforating bank checks and similar monetary papers is now coming into extensive use in New York and other cities, and several different kinds of tools or office implements for making the perforated figures with facility are, it is stated, finding a ready and increasing sale.

Cat Climax.

A WRITER in the *English Mechanic* exults greatly on account of the success of a device put into practice by him for preventing cats from coming over the fence into his yard. This consists in nailing down horizontally a piece of wire gauze or netting, having a coarse mesh, along the top of the fence, and projecting about two feet on each side. The netting will bend slightly downward by its own weight; and, while it does not exclude the light or rain from the garden, will resist the most persevering efforts of any cat to surmount it.

Wood as Blast-furnace Fuel.

THE use of wood as fuel in blast-furnaces where an unusually pure product of iron is desired has been more or less in vogue for three-fourths of a century or thereabouts, and on page 201, Vol. IX., of the AMERICAN ARTISAN, we gave a sketch of the same as successfully practiced at Phonitz, in Hungary. We append an article by Mr. G. M. Fraser, a correspondent of the *Engineer*, which embodies some new data on the subject:—

"At a time like the present when the better and purer qualities of pig-iron are confessedly being much sought after, and when, too, proposals are before the public for the establishment, at all events, in one of our colonies—Canada—of iron-smelting works in which wood will be the fuel employed, a few notes on the management of blast-furnaces using that fuel may perhaps be deemed apposite and interesting. It is not, of course, proposed by the writer, nor would it be possible within the limits of a short article, to enter on or discuss the many essential differences in the working of furnaces consuming wood and those using mineral coal; yet some points may, perhaps, be usefully noticed, and difficulties especially appertaining to the former so far explained as to lead to suggestions for their removal. The first great difference, then, which attracts the notice of any one whose experience, like that of the writer, commenced among coke-burning furnaces, is the almost Liliputian proportions of one for the use of charcoal—a height of 36 feet or 38 feet, and a diameter across the boshes of 6 feet or 6 feet 6 inches, producing what is really but a mere pygmy when compared in capacity to one of our modern mineral fuel leviathans. And when it is remembered that everything else is generally diminished in like ratio; that the charges of charcoal are only from 56 lbs. to 60 lbs. in weight, the burden of ore proportionately small; whilst the pillar of blast seldom exceeds 1½ lbs. to 2 lbs.; it will readily be seen that the data of operations are in every respect essentially different.

"It may be premised here that the furnaces about to be spoken of reduced principally a black magnetic oxyd of iron, combined with, at certain times, but scarcely perhaps successfully, a small quantity of a species of hematite containing a very considerable proportion of titanic acid; and that the fuel consisted in one case of charcoal made from large hard timber, and in the other of a coal produced from a kind of acacia, which, although very hard and close-grained, seldom exceeded an inch in diameter. Perhaps it may be as well to remark now that the writer's experience goes to prove that there is nothing so injurious both to yield and quality in a charcoal furnace as anything approaching a *soft* coal, and that the brighter and clearer the fracture—so indeed that it will not mark the fingers when touched—the better the coal for use; the heavier the burden it will carry, and the stronger will it descend to the point at the tuyeres where the blast directly impinges. At the furnaces spoken of there was some little difficulty in obtaining a coal of this hardness, the natives of the country being accustomed to prepare theirs in little holes in the ground, and only just sufficiently covering the wood with sand or soil to prevent free combustion; but eventually this plan was got rid of, and large well-covered pits of wood successfully charred.

"Sufficiently simple was the operation of blowing in such toy things of furnaces as those in question, but the resulting pig-iron presented certain anomalies which as yet the writer has scarcely found satisfactorily explained. In the first place, one peculiarity of this iron was its extraordinary tendency to *chill*—this tendency, indeed, almost invariably exhibiting itself, and being evident round the edges of the pigs even when their centers were dead dark gray—and when, too, at the time of tapping, the kish (carburet) might be seen flying about the cast-house, and lying in large flakes on the surface of the scoriæ. Again, in second-melting this same pig-iron, there was a like tendency to run high, though the castings made from it would, if annealed, lose all whiteness, and come out of the oven close gray; this process, however, much affected their appearance, and consequently deteriorated their marketable value. The use of a very few pounds per charge of the hematite ore before mentioned—which, however, had but little or any color justifying the name—had also a remarkable effect on the quality of the produce, for this was surely followed by a tendency to high quality, and a good deal of scintillation in running, whilst the pigs would show on fracture a peculiar lamellar structure which the writer has never noticed in others. These were thin lamellæ, sometimes so distinct and separate in the center of the pigs that they might be removed with a penknife.

"The question of the respective advantages of hot and cold blast was certainly at these furnaces distinctly settled, in the opinion of the writer, in favor of the former, and that both with reference to the grayness of the produce and the general easy working; and as by the adaptation of Venetian blind grates to the stoves the heat was generated from the siftings of the charcoal, the cost of heating was reduced almost to the mere expense of firing these most simple and excellent arrangements for burning dust-fuel. Having no other pyrometers than those of the melting points of different mixtures of metals, it is scarcely possible for the writer to be very definite as to the temperature employed, but his impression is that the average was about 350°—and anything like carelessness in firing at the hot-air stove causing a reduction of heat was sure to be at once followed by a high quality of pig, and a corresponding inclination of the scoriæ to run sluggishly, with an increase of weight indicating imperfect reduction. There was, however, in opposition to any improvement in quality from the use of hot-blast, certainly a tendency, perhaps attributable to it, to burn out the furnace lining immediately above the tuyere, that is, the portion between the tuyere arch and bottom boshes, and this sometimes gave rise to considerable inconvenience and trouble. Possibly this said tendency might have been checked by a water-bosh above the tuyere, but as the conveniences for placing this there were not very available it was never fairly tried, and the remedy of blowing from the other side for a time generally adopted, which was to some extent, if not perfectly, successful.

"It may, perhaps, be noteworthy here to remark that the furnaces were worked with closed tops, and the gases used under the blowing engine-boilers, and at one time, when the charcoal supply was short, the experiment was tried of substituting, in the proportion of two bulks for one, stove-dried billets for every fourth charge of charcoal, with the result of such a large increase in the quantity of gas given off that the engine ran freely with scarcely any fuel under the boilers. But then, on the other hand, there resulted a very perceptible deterioration of quality in the pigs, and a tendency to scaffolding in the furnace itself, which was, of course, detrimental both to profitable

yield or equable character of out-turn. The writer has, however, since thought that, had these dried billets been regularly mixed with the charcoal instead of being put on in a body at every fourth or sixth charge, the effect might have been better, and the tendency to disturbance and uneven working obviated.

"Compared, as before mentioned, to one of the leviathan mineral-fuel blast-furnaces of the present day, these consuming charcoal were but playthings, the out-turn never fairly exceed 40 tuns per week of pig, whilst the average was about 35; but there was a certain niceness and possibility of keeping everything about them in perfect order, which bore a very pleasing contrast to the filth and dust generally found in the neighborhood of an English smelting-works. Direct running of castings was only partially successful; but, looking at the present prices of pig-iron and the confessedly increasing demand for the best and *purest* qualities, the writer cannot but think that charcoal-iron making is an enterprise likely to take great development, and one especially adapted to those of our colonies, where large tracts of forest lands are to be found in the neighborhood of ore deposits; giving, as he ventures to conceive it would, at once remunerative returns for the capital employed, and preparing, as it also would, by clearing these forests, the way for the emigrant cultivator. The points of climate, possibility of procuring labor and its cost, distance from the means of carrying the produce to market, are all questions requiring most serious consideration; but he feels convinced that they are also questions capable, in many instances, of solution in such a manner as would bring profit to the promoters of the enterprise and essential benefits to the countries in which such works might be established."

Iron Ship-building in Germany.

It was a long time before the ship-builders of North Germany took to iron ship-building, timber being still cheap and an abundance of good carpenters at hand, while skilled mechanics conversant with iron ship-building have been very scarce. This, however, has completely changed during the last four or five years, and a number of iron ship-building yards are now in existence on the German shores of the North Sea and the Baltic. The firms of Waltjen and Lange, at Bremen, some years since constructed a number of fine sea-going steamers, and at Bremerhaven and Grestermünde other yards are beginning to do the same. The Reiherstieg yard of Messrs. Godefroy & Co., at Hamburg, long ago gained a well-merited reputation for its iron ships and marine engines. The North German Ship-building Company, at Gaarden, near Kiel, which was formed in 1867 only, has at this moment nine steamers on the stocks of between 450 and 1,500 tuns, builders' measurement, for German, Danish, and St. Petersburg firms. It has also constructed some heavy tug-boats, like the *Hercules*, and large iron barges for the transport of stores for the German Navy. The new Rostock Ship-building Company is doing a fair business in iron sailing-ships, and the Vulcan Engine and Ship-building Works, near Stettin, have a large iron-plated turret-ship, of the *Monarch* class, called the *Barbarossa*, on their slips, as well as smaller steamers for the merchant navy. A new firm, the Stettin Engine and Ship-building Works, at Grabow, near Stettin (formerly Möller & Holberg), have just begun business, and the yards of Devrient at Dantzic, and Mitzlaff of Elbing, are building a number of iron ships, besides some torpedo-boats for the German Navy. Though these German yards cannot compare with those of England and Scotland, it must be admitted that they have made a very fair start.—*Engineering.*

Petroleum in Iron Manufacture.

Much attention has been drawn to experiments with petroleum in iron-making for some months past in progress in the La Clede Mills, St. Louis. No reliable data are afforded concerning the smelting of ores, but the results in converting pig into bar and malleable iron are said to be good. We quote the *Pittsburg Commercial*:—

"One of the tests—all of which are said to have been of the most thorough character—employed to ascertain the effect of petroleum heat, consisted in puddling 1,000 pounds of pig-iron, smelted with raw Illinois coal in 1859, and which, owing to the large debasement by sulphur, had been thrown aside as worthless. Frequent efforts have been made from time to time to reduce the mixture to merchantable iron, but to no avail. Since 1864 it had lain neglected. A single hour's treatment with liquid gas, however, is said to have turned the mass out in the shape of iron of the finest quality, closely resembling steel, and perfectly free from sulphur and all other impurities. Specimens were exhibited, and were pronounced by old iron men as of the very finest quality of metal, equal if not superior to the best charcoal iron.

"Other experiments are said to have demonstrated that common Iron Mountain pig-iron could, by a single application of the liquid fuel in the puddling furnaces, be made into the best flange boiler iron, which, under the severest tests, was shown to be equal to the first quality Sligo or Low Moor iron, a range of capacity which is reported to have astonished even the most sanguine believers in the patent.

"It is asserted that the iron manufactured by using this fuel has been tested in almost every conceivable manner, and that these tests prove its tensile strength as well as its capacity to sustain weight to be far above the average; in the former showing a tensile strength of more than 1,000 pounds greater than specimens of Low Moor iron. The workmen in the mill are said to be greatly interested in the experiments. They recently satisfied their curiosity by rolling this iron into sheets, and, though still experimenting, have produced sheets so thin that five hundred of them are but one inch thick. These sheets are described as being remarkably tough and flexible. Numerous other experiments are also reported to have been made, with only temporary machinery and apparatus for the use of petroleum fuel, but with the most satisfactory results.

"From these experiments it would appear to be considerably cheaper than coal in its use and handling, so far as the heating of the iron for the rolls is concerned, while the saving in 'scrapping' gives it a still further economic advantage, as the following results obtained in the scrapping furnace show:—

Iron placed in the furnace	7,950 lbs.
Iron taken out	7,751 lbs.
Showing a loss of	199 lbs.
Loss with coal 15 per cent. on	1,192 lbs.
Deduct loss with liquid fuel	199 lbs.
Saving with liquid fuel	993 lbs.

"Although petroleum is generally known to be a concentration or distillation of coal, and that in proportion to the crudity of the coal to the concentrated character of the petroleum is the intensity of the heat produced by the petroleum greater than the heat of the coal, yet this seems to be the first definite and sustained attempt to apply the greater intensity to practical uses, and to employ it as a refined mechanical force. Heretofore, coal has been the main aliment of industry, and such is its importance and value throughout the civilized world, that any material which supersedes it in cheapness and importance in the more essential uses of industry and commerce, must necessarily be an agency of incalculable value, and work a corresponding revolution in the development of the resources of the country and their adaptation to the requirements of civilization and the interests of man. As to the supply of the new fuel, so as to render its use a question for economy, there need be no alarm, for the quantity of it in many parts of the world seems to be inexhaustible and easy of access, and especially is this the case in our own country. Should the claims which are made in its behalf be substantiated by further experiments and investigations, it will probably work an eventful revolution, not only in the manufacture of iron, but wherever heat, steam, or artificial light are employed or required."

Burning of a Great Car Factory.

The Ohio Falls Car-works, at Jeffersonville, Ind., were destroyed by fire on the afternoon of March 20. The fire was discovered among the shavings in the planing-mill, supposed to have caught from a spark from the smoke-stack, and spread to the remainder of the works and the lumber-yard in the same inclosure, all of which were consumed. The works are believed to have been the most extensive and complete of the kind in the country. The buildings alone covered five acres of ground, besides a number of sheds and lumber-yards. A large amount of machinery of the finest quality, with a large quantity of car material, were in the buildings. The works employed about 700 men. They had orders at the time of the fire for 2,000 cars. Sixteen passenger coaches, nearly finished, a number of freight, and other cars were burned. The works cleared a net profit last year of $200,000. The loss will reach $500,000. The insurance is about $300,000.

The Plympton Scientific Society.

A new society under the above title was organized last autumn by the graduates of the Cooper Union, and has continued to hold fortnightly meetings during the past winter. These, devoted to the discussions of various scientific subjects, including the conservation of forces, the employment of steam-power, the structure and formation of coal, the Darwinian theory, and others, have, we are informed, been uniformly successful, and the organization can scarcely fail to be of much benefit to the young men who have its management in hand. At the latest meeting, held on the evening of March 16, Mr. M. Ryan read a paper on the history and construction of the East River Bridge.

Coal Production of 1871.

In spite of the strikes and riots at some of the coal-mines at the beginning of the year 1871, the total amount of coal mined during the year was nearly 250,000 tuns more than in the year 1870. A comparison of the amount sent to market from the three principal regions during the last ten years shows that the production of the Schuylkill region for 1871, amounting to 5,124,780 tuns, has not been equaled before; that the production of the Wyoming region, 6,481,171 tuns, was only surpassed in 1870; and that the production of the Lehigh region, 2,249,356 tuns, fell short only of the amounts mined in 1870 and 1868.—*Evening Post.*

Improved Locomotive Head-light.

We take from the *Railroad Gazette* the accompanying engravings of an improved head-light for locomotives, made by the Radley & McAllister Manufacturing Company, of New York City, and in which gas from petroleum products is used as the illuminating agent. The invention has, it may be mentioned, been tested for some years past on the Baltimore and Ohio, the Philadelphia, Wilmington, and Baltimore, the Erie, and other railway lines, with, it is stated, highly satisfactory results.

The construction of the apparatus is at follows:—An ordinary parabolic reflector, B, B, is arranged in suitable relation with the burner, *x*, and the

Fig. 1.

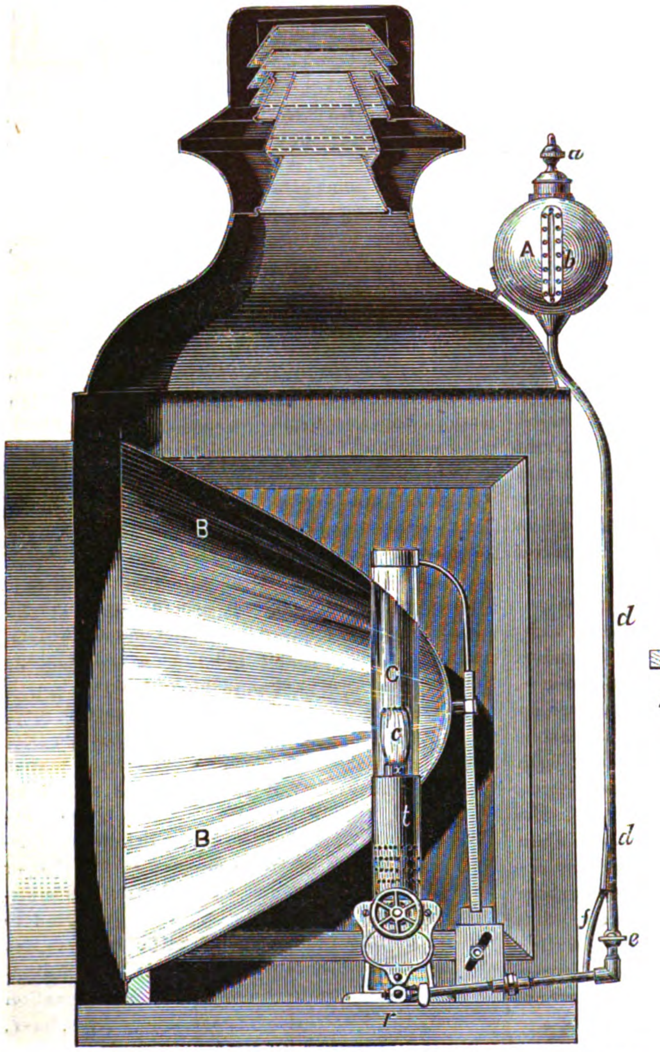


Fig. 3.

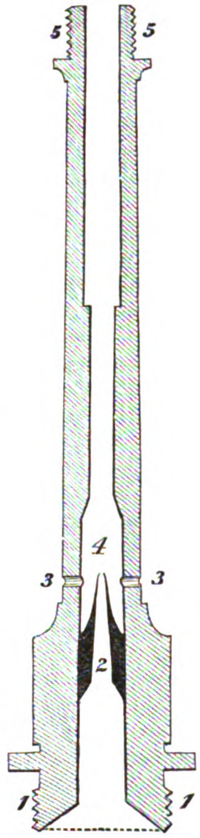


Fig. 2.

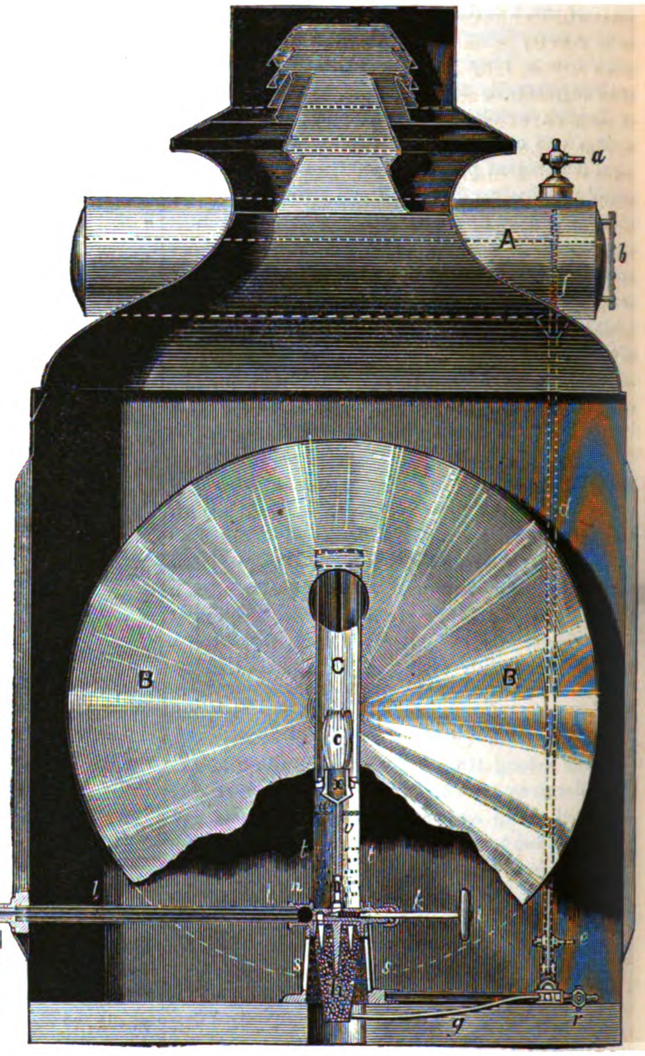


Fig. 4.

IMPROVED LOCOMOTIVE HEAD-LIGHT.

lamp-chimney, C. The flame is fed by gas produced by steam-heat on gasoline, one of the volatile products obtained by the distillation of petroleum. The gasoline is contained in a tank, A, and is carried down by the pipe, *d*, *e*, *g*, to the chamber, *h*, Fig. 2. This is filled with excelsior wood shavings. The top of this chamber is made of brass, and has a number of long projections extending down some distance into it and among the shavings. The top has also a chamber of a horseshoe form, shown in section in Fig. 2, and in plan in Fig. 4. This is connected with the boiler by a steam-pipe, *l*, *l*, which is inclosed inside of an exhaust-pipe. The effect is a constant circulation of steam into and through the chamber, *m*, *m*, Fig. 4. By this means the whole top of the vessel, *h*, is heated, and the heat is communicated by the projections, before referred to, to the shavings, which are saturated with gasoline. In this way it is vaporized and escapes through the opening, *n*, and tube, *v*, to the burner, *x*; *k* is a valve-stem with a small conical valve on the end, to close the communication between the vessel, *h*, and the burner.

The tube, *v*, is represented on an enlarged scale in Fig. 3. The vaporized gasoline passes through the small orifice, 4, and thus creates a current of air through the holes, 3, 3, which mingles with the vapor. The combination of the vaporized gasoline and atmospheric air forms a very inflammable gas with a high illuminating power. To the top of the tube, *v*, is attached an ordinary Argand burner, *x*; *v* is a wire netting interposed between the burner and the lower part of the chimney, to prevent the communication of the flame from the one to the other. The vessel, *h*, is also surrounded by a perforated plate, *s*, *s*, for the same purpose.

The tank, A, is filled by unscrewing cock, *a*, the latter being intended to allow any undue pressure to escape; *b* is a glass gauge to show the quantity of the fluid in the tank; *e* is a cock to open communication from the tank to the vessel, *h*. The pipe, *f*, Fig. 1, is connected with the main pipe, and extends up inside the pipe, *d*, to the top of the tank, A. Its object is to allow any gas, which might produce an excessive pressure in the chamber, *h*, when the cock, *e*, is closed, to escape into the tank, A, and thus be condensed.

Rotary Engines.

[From the *Engineer*.]

We wish our readers to understand, without the possibility of mistake, that we are dealing purely with the mechanical theory of the rotary engine in these articles, and that no engine precisely similar in construction to that which we have selected as theoretically the best form which a rotary engine can assume has ever been patented or made. As to whether such an engine could be made successfully we have serious doubts; but these doubts do not refer to the theory of the machine, which we hold to be absolutely sound, but to the difficulties which would be encountered in carrying the theory into practice. All these difficulties would be due to imperfections in workmanship and material; but, if it were possible to overcome these difficulties, then it would follow, as a matter of course, that a type of steam-engine very much superior for many purposes—though not for all—to that now in use, would be placed at the disposal of employers of steam-power. As we proceed we shall explain the objections which exist to each feature of the machine, leaving it to the ingenuity of our readers to devise means of overcoming them should they think proper.

In our last article* we explained that the working of the abutment constituted one of the most important problems with which we have to deal; and it may be well to explain here that the reason for making the piston so narrow as 4 inches for an engine of nearly 150 horse-power, lies in the fact that by so doing we reduce the travel of the abutment. It will be seen that the abutment cannot begin to close in behind the piston until the piston has passed it a little way. The act of closing cannot be instantaneous, and, therefore, while the abutment is moving through, say, 4 inches, the piston will also have advanced on its course, and as its velocity is enormous, it will have passed over a very considerable space unless the velocity of the abutment is also enormous. If the velocity of piston and abutment are identical, then 4 inches will intervene between the abutment and the piston at the moment the first is home. Steam is admitted at the same moment, and we have 4 inches of clearance. The waste of steam in this space will be considerable if the engine is worked very expansively; for, if we suppose the diameter of the circle described by the center of effort to be, say, 9 feet 8 inches, and the circumference to be 29·3 feet, then, if the steam is cut off at 0·1, it will be admitted for, but in round numbers, 3 feet; and 4 inches would be one-ninth of this, and

FIG. I

FIG. 2

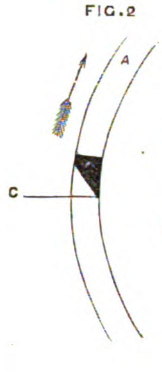
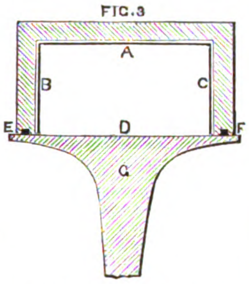


FIG. 3



therefore an enormous clearance; not all dead loss, it is true, but still a loss to be avoided, above all in an engine intended to be theoretically perfect. One mode of reducing the loss, as we have already explained, consists in sloping off the back of the piston so that a portion of the waste space will be filled up; by this means the clearance can be reduced one-half. The arrangement will be understood from the accompanying diagram.

In Fig. 1, A is a portion of the annulus; B is the piston with sides nearly in the plane of the radius of the annulus; C is the abutment. The abutment begins to close at the moment the back edge of the piston passes the point, E; but, while the abutment is moving from E to F, the piston has advanced from D to G. This is the clearance space. In Fig. 2 it will be seen that the back of the piston is sloped off at such a rate as just to keep out of the way of the slide, and thereby the clearance is reduced one-half. If we also slope off the abutment and make it very thick, we may virtually get rid of the clearance difficulty altogether. It may, therefore, be laid down as a principle that it is possible so to shape an abutment working vertically and a piston working circumferentially that clearance will be done away; and, furthermore, this principle can, within reasonable limits, be so applied that it will be unnecessary to impart a very high velocity to the abutment, because the piston may be supposed to travel a couple of feet while the abutment is moving through not more than 4 inches. There is a grave practical difficulty to be got over here, however, which is that as much of the outer ring of the annulus must be removed as the abutment is long—or rather thick—and as this space is not filled up when the abutment is withdrawn, the packing-ring of the piston would be destroyed by flying out and catching the edge of what we may term the abutment port. Therefore, it is only safe to assume that one-half the clearance could be saved, and that by the prolongation of the piston in the rear. There is no difficulty, we may explain, in getting the abutment out of the way soon enough; for let us suppose that we determine to expand the steam ten times, then, in such an engine as we have sketched, steam would be admitted for such time as the piston was passing over a distance of, say, 2 feet. If it were cut off when the piston had travelled 18 feet more, the piston would have got round but two-thirds of the circle. The abutment might then be withdrawn, the steam would rush to the condenser, and the process of withdrawing the abutment might last during such time as the piston took to get over, say, 5 feet of its course. The difficulty lies not in getting the abutment out of the way, but in getting it back again in good time. We have said nothing as to the mode in which the abutment is to be put in motion, nor shall we enter into any particulars on the subject. Some form of cam, worked from the main shaft, suggests itself at once; and it would probably be well to compress a strong spring in the act of taking the abutment out, which, being suddenly released at the proper moment, would drive the abutment in again in the shortest possible time. The Corliss valve gear supplies an illustration of the principle involved.

A favorite device with many inventors for getting over the abutment difficulty consists in making the abutment rotate; that is to say, it consists of a wheel with a notch in the circumference, into which notch the piston enters when passing the abutment. There are some good points about the plan, but it entails so much friction, and such difficulty is met with in making the joints tight, that we believe the sliding abutment is on the whole to be preferred. The reason sliding abutments have not found favor hitherto must be sought in the fact that they were always made nearly as long as the radius of the engine; but there is nothing in common between a sliding abutment, say, a couple of feet deep, and having of course a stroke still longer, in a machine working with a very moderate velocity of piston, and an abutment not more than 3 inches or 4 inches deep, working in a machine giving out great power, simply because of the enormous space gone through by the piston at each revolution.

We may now proceed to consider the nature of the means to be adopted in connecting the piston with the main shaft; the method of making the joints tight without undue friction; and the way in which steam is to be got into and out of the engine. The latter point may be dismissed at once. The exhaust can open just behind the abutment, the port being so made that the piston packing cannot get entangled with its edges. The steam will best be brought in through the main shaft and piston; it is quite unnecessary to explain how. As regards the connection of the piston with the main shaft, no better device can be adopted than a disk. We give a cross section of a rotary engine to illustrate our meaning, and this brings us directly to the most important part of all, namely, the means of making the joints tight, involving as it does a difficulty which has never yet been got over in any rotary engine, so far as we are aware.

It will be seen that, make what disposition of the parts we will, there are four edges of the piston or their equivalent to be packed. If we adopt the arrangement shown in Fig. 3, it is true that only three edges of the piston, A, B, C, have to be packed; the fourth, D, being part and parcel of the disk, the wide flange of which is made tight at E, F, by packing-rings. In the same way the abutment will rest on a scraped face, the section of A, B, C, and will require no packing; but its inside edge must rest against the turned face of the flange, G, and, therefore, it must be fitted with the packing saved from the piston. Now, on the whole, it will be found the best plan to concentrate the packing in the piston and the scraped face-joints in the abutment as much as possible; therefore, the annulus may be made of the form shown in cross section in Fig. 4. The abutment will then have a fixed bearing, except the small portion of its length from A to B, representing the thickness of the disk, say, 3 inches. By adopting this plan, we are able to dispense with a rectangular cross-section, and adopt that shown in Fig. 5, which gives a form of piston as easily packed as though it were made of the ordinary cylindrical form. Supposing this piston and abutment to be made tight, we have next to make the disk tight with the casing or annulus, and this is no small undertaking. The length of joint to be made tight in a 10-feet engine is about 60 feet, or as much as would be represented by the piston of an ordinary engine, with a cylinder 120 inches in diameter. Nothing is more easy than to make a good job with packing-rings, but it unfortunately happens as a result of the action of these rings that the frictional resistance is enormous. We have stated that the success or failure of such an engine as

FIG. 4

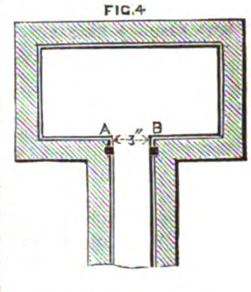
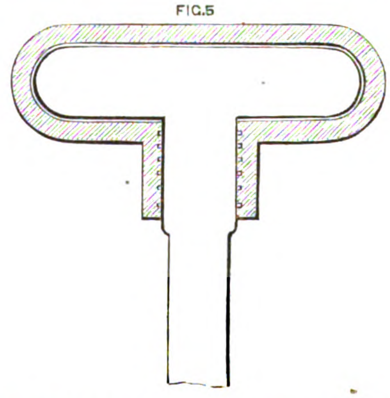


FIG. 5



we are considering is simply a question of workmanship, and, in making that statement, we had the construction of tight joints specially in view. We do not believe it to be possible to arrive at a satisfactory result if any attempt is made to pack the joints between the disk and the annulus in the ordinary way. The solution of the problem probably lies in making the disk for a considerable portion of its breadth, say at least a foot from the edge, absolutely true. The cheeks of the annulus must be made equally true, and we must rely on a series of grooves turned in the cheeks to keep the joint tight, as in the ordinary solid piston. With first-class workmanship the thing may be

* See page 165, current volume of the AMERICAN ARTISAN.

done; and the leakage may be still further reduced by inclosing the whole engine in a case filled with steam from the boiler. The leakage would then be from this jacket into the engine, and would vary in amount, of course, as the pressure inside and outside varied. The packing of this joint constitutes, in one word, the great problem to be solved—the great difficulty to be overcome in constructing a thoroughly efficient rotary engine. The working of the abutment is a matter requiring much careful thought, but it presents no insuperable obstacle to the competent engineer. We wish we could say as much for the annulus joint. How to make this tight without excessive friction is the question, and we have no doubt but that in proper hands its satisfactory solution would prove a very remunerative speculation. It is, to say the least, highly probable that an engine, occupying no more space than a fly-wheel, and simply bolted up against the wall, would become extremely popular, especially as the engine would be eminently economical and efficient.

We have endeavored to do nothing more, it will be seen, than direct attention to certain points in the theory of the rotary engine which have hitherto been completely overlooked by the very few authors who have written about the machine. Not a year elapses without the so-called invention of half a dozen rotary engines. The inventions are in due time patented, some money is perhaps spent in making one or two, which fail on trial, and so nothing more is heard of the scheme. There is a remarkable family resemblance in these devices. We find the same features patented over and over again, and the inventors almost invariably manifesting total ignorance of the real nature of the difficulties to be overcome. We have written this and the preceding article in the hope that the explanations we have given may serve to keep some inventors from wasting their time and money, while they may, perhaps, serve to direct the thoughts of others to the direction in which alone success can be found.

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AND EACH BEARING THAT DATE.

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124,653.—BUREAU WASHSTAND AND COMMODE COMBINED.—Louis Aling, Zealand, Mich.

124,654.—PIPE-WRENCH.—Lybrun Anderson, assignor to himself, Lewis H. Schneider, and John Martin, Washington, D. C., said Schneider assigns his right to said Anderson and Martin.

124,655.—HAND-STAMP.—Franklin L. Bailey, assignor to himself and George A. Walker, Boston, Mass.

124,656.—DOWEL-HOOP FOR COOPERAGE.—Asa W. Ballou, St. Charles, Mich.

124,657.—STREET-SPRINKLER.—Lorey F. Bancroft, Worcester, Mass., assignor to himself and Andrew B. Yetter, New York City.

124,658.—FRUIT-DRIER.—Sebastian C. Barth, Indianapolis, Ind. Ante-dated March 2, 1872.

124,659.—DEVICE FOR CUTTING OFF PIPES.—William H. Barwick and William T. Farre, Montreal, Canada.

124,660.—MEDICAL COMPOUND FOR SKIN DISEASES.—Frederick W. A. Bergengren, Stockholm, Sweden.

124,661.—CORN-HARVESTER.—James H. Besant, Point of Rocks, Md., and Mahlon B. Atkinson, Georgetown, D. C. Ante-dated Feb. 29, 1872.

124,662.—CAR-STARTER.—Charles B. Broadwell, assignor of one-half his right to Paul Cook, New Orleans, La.

124,663.—HOT-AIR REGISTER.—Benjamin Bunce and Raymond Salt, New York City.

124,664.—WHIFFLETREE.—Neil Campbell, Brooklyn, E. D., N. Y. Ante-dated Feb. 28, 1872.

124,665.—STREET-LANTERN.—John Cook, New York City.

124,666.—FOUL-AIR ESCAPE FOR WASTE-PIPES.—Joseph Daniels, Washington, D. C.

124,667.—THREAD GUIDING AND CUTTING DEVICE FOR BOBBIN-WINDERS.—Thomas M. Day and Henry Shook, Washington Court-House, Ohio.

124,668.—RELEASING APPARATUS FOR STABLES.—Abram Dehuff, York, Pa.

124,669.—METHOD OF CUTTING THIN MATERIAL.—Adolph Delkescamp, Brooklyn, E. D., N. Y., assignor to Jacob J. Nichols, New York City, and William H. DeGraw, Westfield, N. J.

124,670.—WAGON SPRING-SEAT.—Samuel W. Denny, Blueville, Ill.

124,671.—AIR AND GAS ENGINE.—Abel Hureau de Villeneuve, Paris, France.

124,672.—BASE-BURNING STEAM-BOILER.—Zoheth S. Durfee, New York City.

124,673.—STREET-LAMP.—Michael B. Dyott, Philadelphia, Pa.

124,674.—PHOTOGRAPHIC CAMERA BOX.—Mathias Flammang, assignor to Scovill Manufacturing Co., New York City.

124,675.—WASHING MACHINE.—Lockwood Gail, Buffalo, N. Y.

124,676.—IRON-PLANING MACHINE.—Alexandre Gastel, assignor to himself and Charles E. Mutrix, Philadelphia, Pa.

124,677.—PADLOCK.—Charles F. Gerlach, assignor to himself and James M. Whaling, Milwaukee, Wis.

124,678.—MOWING MACHINE.—Lafayette Gorden, Vanlue, Ohio.

124,679.—STEAM-PUMP.—Lewis Griscom, assignor to himself, Chalkley Griscom, and John P. Griscom, Port Carbon, Pa.

124,680.—FIRE-ALARM.—Frederick F. Herman, Grafton, Mich.

124,681.—HAND-DRILL.—Louis Hillebrand, assignor to Hillebrand & Wolf, Philadelphia, Pa.

124,682.—HEEL FOR BOOTS AND SHOES.—John Morrison Hunter, New York City.

124,683.—MACHINE FOR FORMING AUGER BITS.—W. A. Ives, New Haven, Conn.

124,684.—CAR-COUPLING.—John W. Jones of Philip De Catesby, of Hereford, Md.

124,685.—BELL-HANGING.—Marcus R. Jones, Troy, N. Y. Ante-dated Feb. 29, 1872.

124,686.—FENCE-POST.—Joel F. Keeler, Pittsburg, Pa.

124,687.—VENTILATOR.—Lewis Kelley, Boston, Mass.

124,688.—MODE OF COKING FOSSIL COAL.—George Lander, Irwin, Pa.

124,689.—MODE OF COKING FOSSIL COAL.—George Lander, Irwin, Pa.

124,690.—PAPER-CUTTING MACHINE.—John Leviness and Preston Van Horn, Brooklyn, N. Y., assignors to Joseph S. Sanborn, New York City.

124,691.—DIAL FOR CALENDAR WATCHES.—Galusha Maranville, Rutland, Vt., assignor to Charles E. Kilby, Washington, D. C., and David B. Channell, Rutland, Vt.

124,692.—THREE-HORSE EQUALIZER.—Aaron March, Taylor, Ill.

124,693.—POTATO-DIGGER.—John J. Naylon, Chicago, Ill. Ante-dated Feb. 10, 1872.

124,694.—MACHINE FOR SEWING PAMPHLETS.—Charles H. Palmer, assignor of two-thirds of his right to Alfred E. Tilton and A. M. Loryea, New York City.

124,695.—WASHING MACHINE.—Edwin A. Park, Harpersfield, Ohio.

124,696.—SASH-HOLDER.—Jeremiah Peck, New Haven, Conn.

124,697.—CARRIAGE-STEP.—James Pendergast, New Haven, Conn.

124,698.—CLOTHES-LINE REEL.—Henry W. Prouty and Albert Thompson, Boston, Mass.

124,699.—FIRE-PLACE GRATE.—Richard P. Sause, Louisville, Ky.

124,700.—MANUFACTURE OF CAST-STEEL AND REFINED METALS.—William Sellers, Philadelphia, Pa.

124,701.—PRINTING PRESS.—Earle H. Smith, New York City.

124,702.—DEVICE FOR THE MANUFACTURE OF DRAIN-PIPES.—John W. Stockwell, Portland, Maine.

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124,704.—WAGON-JACK.—Izaak Van Kersen, Kalamazoo, Mich.

124,705.—FIRE-KINDLER.—Seth F. Watson, assignor of one-half his right to James H. McMurtry, Richmond, Ind.

124,706.—BABY-WALKING APPARATUS.—Charles D. Westlake and John A. Westlake, Laurel, Md.

124,707.—GRAIN-DRILL.—William Weusthoff and Tempest G. Troup, assignors to Farmer's Friend Manufacturing Company, Dayton, Ohio.

124,708.—WATERPROOF CLOTH FOR CARRIAGE-TOPS, ETC.—Archibald M. Whipple, North Adams, Mass.

124,709.—MACHINE FOR ROLLING LEATHER.—Joel Whitney, Winchester, assignor to himself and Nathan J. Simonds, Woburn, Mass. Ante-dated Feb. 29, 1872.

124,710.—FRUIT-CAN.—Austin A. Wilcox, Philadelphia, Pa.

124,711.—EARTH AUGER.—Isaac Yeazel, assignor of one-half his right to Moses Swartz, Clark County, Ohio.

124,712.—MECHANICAL MOVEMENT.—Christopher Zeitler, Benton's Port, Iowa.

124,713.—BARBER'S CHAIR.—Anthony Abel, New York City.

124,714.—PAPER BARREL.—William H. Bailey, New York City.

124,715.—FIRE-ESCAPE.—John Bearns and Axel Olsson, Brooklyn, N. Y. Ante-dated March 4, 1872.

124,716.—MACHINE FOR JOINTING STAVES.—Azra M. Benson, Cleveland, Ohio.

124,717.—HAY PRESS.—Joel Briggs, Homewood, Ill.

124,718.—MEDICAL COMPOUND OR RHEUMATIC LINIMENT.—John M. Cantrell, Polk County, Oregon.

124,719.—RAILWAY SWITCH.—Patrick Carrigan, Sturgeon, Mo.

124,720.—WAGON-BODY LIFTER.—Edward A. Chatfield, Waterloo, Iowa.

124,721.—LIFTING-JACK.—Henry Clement, Rising Sun, Ind.

124,722.—ROAD PAVEMENT.—Matthew K. Couzens, Yonkers, N. Y.

124,723.—ROTARY HEEL FOR BOOTS AND SHOES.—Albert O. Crane, Boston, Mass.

124,724.—CULTIVATOR.—Samuel Crossley, Rock Island, Ill.

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124,730.—TRAY-HOLDER.—Obed Fahnestock, Indianapolis, Ind.

124,731.—HUB FOR CARRIAGE-WHEELS.—Joinville F. Fowler, Alliance, Ohio.

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124,733.—POCKET-FLASK.—Rogers George, New York City.

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124,735.—BEDSTEAD-FASTENING.—Emanuel G. Gory, Cincinnati, Ohio.

124,736.—PLASTIC COMPOSITION.—Thomas B. Gunning, New York City.

124,737.—FEED-GRINDING MILL.—Mortimer S. Harsha, Batavia, Ill. Ante-dated Feb. 23, 1872.

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124,739.—SNOW PLOW.—Ole Heggem, Chicago, Ill.

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124,741.—WATER-FILTER.—Foster Henshaw, Washington, D. C.

124,742.—SAFETY-GUARD FOR TUBING OF ARTESIAN WELLS.—Alexander S. Hill, Pleasantville, Pa.

124,743.—FRUIT-GATHERER.—Nehemiah E. Hinds, Cooperstown, N. Y. Ante-dated March 7, 1872.

124,744.—MACHINE FOR TRIMMING AND SETTING THE EDGES OF BOOTS AND SHOES.—Samuel H. Hodges, Lynn, Mass.

124,745.—FASTENING-KEY FOR COFFINS.—John Homrighous, Royalton, Ohio.

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124,749.—TIE-LIFTER.—John H. Koontz, Yorktown, Ind.

124,750.—CAR-COUPLING.—Charles F. Kuhnle and Augustus Row, assignors to themselves and John Stewart, Philadelphia, Pa.

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124,752.—HARROW.—Oradon J. Leabo, Forest Grove, Oregon.

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124,754.—OSCILLATING STEAM-ENGINE.—George F. Lowry, Lake Mississippi, Miss.

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124,785.—SULKY.—Michael C. Boyer, Norristown, Pa.

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124,793.—GRAIN-SEPARATOR.—James A. Cohoon, Toledo, Ohio.

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124,813.—PLANING MACHINE.—John Griffen, assignor to Phœnix Iron-works, Phœnixville, Pa.

124,814.—LIFTING-JACK.—John T. Hamilton, Greensburg, Ind.

124,815.—BRACELET FASTENING.—Ralph S. Hamilton, Providence, R. I.

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124,817.—STEAM-ENGINE VALVE.—Abraham W. Harris, Providence, R. I.

124,818.—HANGING-BASKET.—Charles C. Hibbert, Lynn, Mass.

124,819.—STREET-LANTERN.—Charles F. Hollis, Boston, Mass.

124,820.—ROTARY PUMP.—Clark P. Holmes, Havana, N. Y.

124,821.—ANIMAL-TRAP.—James William Fishback How, Canyonville, Oregon.

124,822.—PRINTING PRESS.—Berthold Huber, Williamsburg, N. Y.

124,823.—LAMP.—John S. Hull, Cincinnati, Ohio. Ante-dated March 2, 1872.

124,824.—CHAMBER-POT.—Ferdinand Imhorst, New York City.

124,825.—SAW.—Melvin Jincks, Wallace, N. Y.

124,826.—PEG-CUTTER.—Jacob G. Klock, Mansfield, Ohio.

124,827.—PRESERVING CRANBERRIES.—Le Grand Kniffen, Worcester, Mass.

124,828.—FELTING MACHINE.—Calvin P. Ladd, Bloomfield, N. J., assignor of one-half his right to James T. Sanford, New York City.

124,829.—MOTOR.—Sylvester L. Langdon, New Orleans, La.

124,830.—SPARK-ARRESTER FOR LOCOMOTIVES.—Edward Lannay, Mowrystown, Ohio.

124,831.—CULTIVATOR.—Joseph T. W. Larrabee, Newton, Ind.

124,832.—SAFETY-HOOK FOR WATCH-CHAINS.—George Leigh, Providence, R. I.

124,833.—PROCESS OF MAKING HOLLOW METALLIC AXLES.—William Arnold Lewis, Chicago, Ill., assignor to Hollow-axle Manufacturing Company, Mishawaka, Ind.

124,834.—MANUFACTURE OF RIBBED METAL PLATES OF WHICH TO CONSTRUCT HOLLOW CAR-AXLES.—William A. Lewis, Chicago, Ill., assignor to Hollow-axle Manufacturing Company, Mishawaka, Ind.

124,835.—MOUNTING AND SECURING CAR-WHEELS.—William A. Lewis, Chicago, Ill., assignor to Hollow-axle Manufacturing Company, Mishawaka, Ind.

124,836.—SPICE-BOTTLE.—Joseph L. Likins, Vallejo, Cal. Ante-dated March 14, 1872.

124,837.—CONSTRUCTION OF ORNAMENTAL CHAINS.—Isaac Lindsley, Pawtucket, R. I.

124,838.—ANIMAL-TRAP.—Myron W. Lyman, Chicago, Ill.

124,839.—TICKET-BOX FOR RAILROAD CONDUCTORS.—Nathan B. Lyman, Buffalo, N. Y.

124,840.—COMPRESSION COCK.—John MacClaren, Scranton, Pa.

124,841.—CHURN.—James A. Marine, assignor of one-half his right to Benjamin F. Jones, Mooresville, Ind.

124,842.—HOT-AIR FURNACE.—James H. Mearns, assignor to himself, Job Bartlett, Joseph D. Bartlett, Charles F. Bartlett, and J. C. Bartlett, Philadelphia, Pa.

124,843.—HYDRAULIC MOTOR.—Mordecai Millard, Franklin, Ohio.

124,844.—CLOTHES-WASHER.—Walter I. Miller and Bradford O. Irons assignor of one-third of their right to Robert P. Miller, Lineville, Pa.

124,845.—PORTABLE HAND ROCK-DRILL.—Isaac B. Millner, Watkins, N. Y.

124,846.—PACKING FOR PISTONS, ETC.—Eliza D. Murfey, New York City.

124,847.—BED-BOTTOM.—Marsena M. Murray, Cincinnati, Ohio.

124,848.—PROCESS AND APPARATUS FOR CLEANING, DECORTICATING, AND SCOURING RICE, WHEAT, AND OTHER GRAIN.—Austin B. Paige, Washington, D. C.

124,849.—METHOD OF MEASURING AND CUTTING-OUT SHIRTS.—Norris Sawyer, administrator of the estate of Moses Palmer, Jun., deceased, Lynn, Mass.

124,850.—STOP-VALVE.—Samuel J. Peet, Lowell, Mass.

124,851.—PNEUMATIC WOOL-ELEVATOR.—John Penman, Paris, Canada.

124,852.—STONE-LOADING APPARATUS.—Harman S. Perkins, assignor to himself and Charles H. Abbott, Rutland, Vt.

124,853.—RUFFLING ATTACHMENT FOR SEWING-MACHINES.—Robert E. Peterson, Jun., Philadelphia, Pa.

124,854.—SEWING-MACHINE.—John B. Price and Charles E. Billings, Hartford, Conn.

124,855.—HORSE HAY-RAKE.—Samuel Rockafellow, Moline, Ill.

124,856.—SPLICE-PIECE FOR RAILWAY RAILS.—Clinton Roosevelt, New York City.

124,857.—TREADLE FOR SEWING-MACHINES.—Leo W. Sapp, Cleveland, Ohio.

124,858.—GATE.—Philip Schwebel, Quincy, Ill.

124,859.—PACKAGE FOR ALKALIES, ACIDS, ETC.—Jacob H. Seibert, Philadelphia, Pa.

124,860.—BASE-BURNING FIREPLACE HEATER.—Samuel B. Sexton, Baltimore, Md.

124,861.—TURNING-LATHE.—Francis G. Sheldon, Hudson, Mich.

124,862.—DIRECT-ACTING STEAM-ENGINE.—John B. Smith, Dunmore, Pa.

124,863.—MACHINE FOR BENDING RAKE-TEETH AND OTHER ARTICLES.—James Sugden and Edmonds J. Sugden, Pittsburg, Pa.

124,864.—SAFETY-CATCH FOR PLATFORM-ELEVATORS.—Benjamin Tatham, New York City, and John W. Brittin, Brooklyn, N. Y.

124,865.—BRUSH-HOLDER.—Alfred Homer Trego, Philadelphia, Pa.

124,866.—GAS-BURNER.—Thomas Ward, Columbus, Ohio, assignor of one-half his right to Charles Royle, Brooklyn, N. Y.

124,867.—MECHANISM FOR SAWING OFF AND STRAIGHTENING RAILWAY-RAILS.—Charles While, East St. Louis, Ill., and George Wostenholm, St. Louis, Mo.

124,868.—ELECTRO-MAGNETIC ENGINE.—William Wickersham, Boston, Mass.

124,869.—OXY-HYDROGEN GAS-BURNER.—Asa W. Wilkinson, New York City.

124,870.—MILK-COOLER.—Owel H. Willard, assignor of one-half his right to Henry H. Sawtell, Randolph, N. Y.

124,871.—GOVERNOR.—Daniel John Wolfe, Liverpool, England.

124,872.—PAPER-BOX MACHINE.—Joseph Worell, Philadelphia, Pa., assignor to Joseph S. Sanborn, New York City.

124,873.—APPARATUS FOR AMALGAMATING ORES AND PRECIOUS METALS.—George D. Wyckoff, Oil City, Pa.

RE-ISSUES.

4,807.—PAINT-MILL.—Charles Belcher, Newark, N. J. Patent No. 76,386, dated April 7, 1868.

4,808.—ROTARY STEAM-ENGINE.—Joseph B. Bennett, Brooklyn, N. Y. Patent No. 74,744, dated Feb. 25, 1868.

4,809.—SASH GUIDE-BLOCK.—Alfred Bicknell, Malden, Mass. Patent No. 83,685, dated Nov. 3, 1868.

4,810.—PLOW.—Bengt C. Blomsten, Waupaca, Wis. Patent No. 108,095, dated Oct. 11, 1870.

4,811.—WORK-HOLDER.—Jane E. Gilman, Hartford, Conn. Patent No. 102,534, dated May 3, 1870.

4,812.—CULTIVATOR.—(Div. A.)—James Harris, Janesville, Wis. Patent No. 87,101, dated Feb. 23, 1869.

4,813.—CULTIVATOR.—(Div. B.)—James Harris, Janesville, Wis. Patent No. 87,101, dated Feb. 23, 1869.

4,814.—PROJECTILE FOR FIREARMS.—Carlos Maduell, New Orleans, La. Patent No. 122,620, dated Jan. 9, 1872.

4,815.—METHOD OF EXPLODING NITRO-GLYCERINE.—(Div. A.)—Alfred Nobel, Hamburg, Germany, assignor to the United States Blasting-oil Company, New York City. Patent No. 50,617, dated Oct. 24, 1865; re-issue No. 3,377, dated April 13, 1869.

4,816.—EXPLODING NITRO-GLYCERINE.—(Div. B.)—Alfred Nobel, Hamburg, Germany, assignor to the United States Blasting-oil Company, New York City. Patent No. 50,617, dated Oct. 24, 1865; re-issue No. 3,378, dated April 13, 1869.

4,817.—MANUFACTURE OF NITRO-GLYCERINE.—(Div. C.)—Alfred Nobel, Hamburg, Germany, assignor to the United States Blasting-oil Company, New York City. Patent No. 50,617, dated Oct. 24, 1865; re-issue No. 3,379, dated April 13, 1869.

4,818.—USEFUL COMPOUND CONTAINING NITRO-GLYCERINE.—(Div. D.)—Alfred Nobel, Hamburg, Germany, assignor to the United States Blasting-oil Company, New York City. Patent No. 50,617, dated Oct. 24, 1865; re-issue No. 3,380, dated April 13, 1869.

4,819.—NITRO-GLYCERINE COMPOUND.—(Div. E.)—Alfred Nobel, Hamburg, Germany, assignor to the United States Blasting-oil Company, New York City. Patent No. 50,617, dated Oct. 24, 1865; re-issue No. 3,380, dated April 13, 1869.

4,820.—PICKLE-CASTER.—Horace C. Wilcox, assignor to the Meriden Britannia Company, West Meriden, Conn. Patent No. 123,961, dated Feb. 20, 1872.

4,821.—MANUFACTURE OF ILLUMINATING GAS.—Asa W. Wilkinson, assignor to himself and Philip H. Stevens, New York City. Patent No. 123,588, dated March 6, 1872.

DESIGNS.

5,658 to 5,660.—CARPET-PATTERN.—Robert R. Campbell, assignor to Lowell Manufacturing Company, Lowell, Mass.

5,661 to 5,664.—CARPET-PATTERN.—Joseph M. Christie, assignor to Lowell Manufacturing Company, Lowell, Mass.

5,665 to 5,669.—CARPET-PATTERN.—John Fisher, Enfield, assignor to Hartford Carpet Company, Hartford, Conn.

5,670 to 5,676.—CARPET-PATTERN.—Otto Heinigke, New York City, assignor to Hartford Carpet Company, Hartford, Conn.

5,677 to 5,679.—CARPET-PATTERN.—Henry Horan, Newark, N. J., assignor to Hartford Carpet Company, Hartford, Conn.

5,680 to 5,684.—CARPET-PATTERN.—Levi G. Malkin, New York City, assignor to Hartford Carpet Company, Hartford, Conn.

5,685 to 5,693.—CARPET-PATTERN.—Elemir J. Ney, New York City, assignor to Hartford Carpet Company, Hartford, Conn.

5,694.—PAPER-CLIP.—Joseph Ottner, New Britain, assignor to Hart Manufacturing Company, Kensington, Conn.

5,695.—PUMP.—William Burlingham, New York City.

5,696.—SASH-FASTENER.—Otto F. Fogelstrand, assignor to Hart Manufacturing Company, Kensington, Conn.

5,697.—CHEST-HANDLE.—Otto F. Fogelstrand, assignor to Hart Manufacturing Co., Kensington, Conn.

5,698.—CUPBOARD-CATCH.—Otto F. Fogelstrand, assignor to Hart Manufacturing Co., Kensington, Conn.

5,699.—CEILING-HOOK.—Otto F. Fogelstrand, assignor to Hart Manufacturing Co., Kensington, Conn.

5,700 to 5,701.—SODA-FOUNTAIN.—George F. Meacham, Newton, assignor to James W. Tufts, Medford, Mass.

5,702.—DRAWER-PULL.—Joseph Ottner, New Britain, assignor to Hart Manufacturing Co., Kensington, Conn.

5,703.—BOLT-CASE.—Joseph Ottner, New Britain, assignor to Hart Manufacturing Co., Kensington, Conn.

5,704.—BRACKET.—Joseph Ottner, New Britain, assignor to Hart Manufacturing Co., Kensington, Conn.

TRADE-MARKS.

703.—WHISKY.—Adams, Blake & Taylor, Boston, Mass.

704.—WHISKY.—D. C. Brady & Co., Louisville, Ky.

705.—BLEACHED LONG CLOTH.—Coffin & Altemus, Philadelphia, Pa.

706.—CARBON GAS-LIGHT OIL AND BURNERS.—Michael B. Dyott, Philadelphia, Pa.

707.—MEDICINE.—James R. Nichols & Co., Boston, Mass.

708.—BURNING-FLUID.—William H. Reed, Indianapolis, Ind.

709.—SHIRTS, SHIRT-FRONTS, ETC.—Leopold Sternberger, Philadelphia, Pa.

710.—HEATERS AND STOVES.—Stuart, Peterson & Co., Philadelphia, Pa.

711.—WHISKY.—Thomas E. Moore, Shawhan, Ky.

EXTENSIONS.

19,572.—MACHINE FOR PACKING FLOUR.—Judson Mattison, Oswego, N. Y. March 9, 1858.

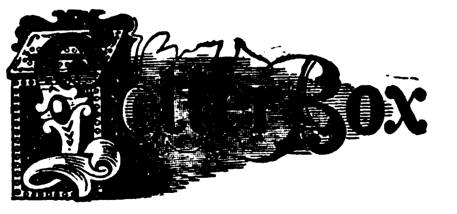
19,637.—GRAIN-SEPARATOR AND SCOURER.—Simeon Howes, Silver Creek, and Gardner E. Throop, Syracuse, N. Y. March 16, 1858; re-issued March 5, 1872.

19,594.—VALVE FOR STEAM-ENGINE.—Isaac Van Doren, Annandale, N. J. March 9, 1858.

19,555.—SPLICE FOR JOINTS FOR RAILROAD RAILS.—John H. Norris and Edward W. Scudder (executors of the estate of Mark Fisher, deceased), Trenton, N. J. March 9, 1858.

19,548.—MODE OF TIGHTENING AND SECURING THE KEYS OF THE JOURNAL-BOXES OF CONNECTING-RODS OR PITMEN.—Levi Dederick, Jersey City, N. J. March 9, 1858.

19,610.—RAISING DOUGH.—James Perry, Brooklyn, N. Y., and Joseph C. Fuller, Orange, N. J. (executors of the estate of Elisha Fitzgerald, deceased.) March 9, 1858.



G. M., OF N. Y.—We know of no cement sufficiently strong to fasten iron castings to wood. If the pieces of metal were very small, melted shellac might answer the purpose.

G. H. D., OF ME.—The cost of springs, such as you require for your traps, would depend wholly upon the quantity wanted, a large number costing less in proportion than a few. Copper wire will doubtless be preferable for your purpose. In making a moderate number of traps to first introduce them to the public notice, you could probably get the springs made more satisfactorily by ordering them at some small shop in your vicinity, than from a distance as great as from New York. It will not corrode from exposure as quickly as steel. Not requiring to be annealed, it will be of more uniform quality than the steel, and easier applied to use.

E. L. M., OF MO.—R. H. Allen, 189 Water Street, dealer in agricultural implements, can probably afford you the information you desire. Our article on needed improvements in hop-presses was written from familiar and practical acquaintance with the subject. We believe the difficulty much harder to overcome than you appear to think, but a practical means of obviating it would be of very decided utility.

C. R., OF VT.—We do not think that strength and softness are combined in any wire in a higher degree than in that made of soft copper.

J. R., OF N. Y.—As the same quantity of liquid in a large vessel would have a much larger evaporating surface than in a small one (supposing both to be of ordinary kettle form), it is safe to suppose that practically the evaporation, for a given quantity of heat, would be greater in the former than in the latter.

G., OF N. Y.—The percentage of oil-of-vitriol in the "pickle" for cleaning iron castings varies much in different foundries. An experienced founder tells us that he has obtained good results with ten per cent. of acid and ninety of water.

I. M. G., OF MO.—Theoretically, the "power" of a screw is—minus the friction—the same as that of a lever, the short arm of which equals the pitch of the screw, and the long arm the radius of the wheel by which the screw is worked. The friction depends so much upon the finish of the screw, the character of the lubricant, the materials of which screw and nut are made, and the pressure upon the same, that no general rule for calculating it can be laid down. The same reasons stand in the way of any accurate estimate of the weight which two horses, even assuming the strength of these to be known, could raise a given distance in a stated time.

L. L., OF N. H.—To polish granite, scour with sand and water, by rubbing with a smooth-faced piece of iron. After the surface has been reduced as smooth as possible with this, substitute fine emery for the sand. When the limit of smoothness with this abrading material is reached, finish with a felt pad and putty-powder.

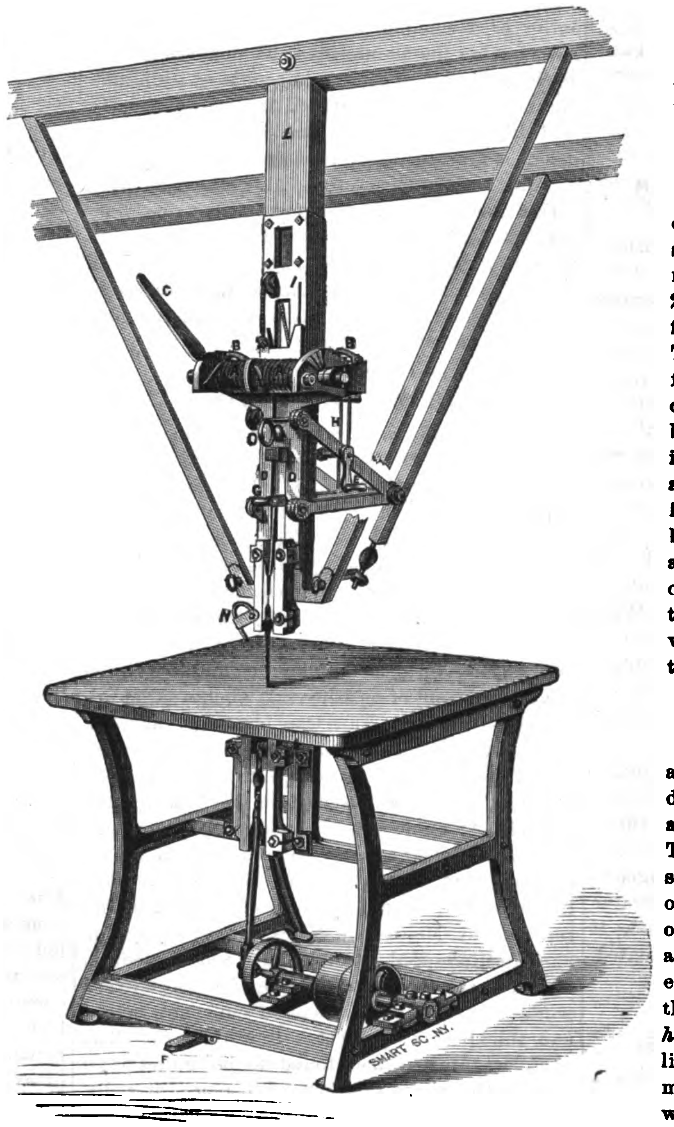
A NEW branch of industry—that of creating shamrocks out of ivy leaves with the help of scissors—was developed among certain enterprising juveniles of both sexes on St. Patrick's Day. A diminutive genius who may yet be President of the United States boasts of having in this way earned $5 by ivy leaves appropriated from a church.

Beach's Spiral-spring Scroll-saw.

WE herewith illustrate an improved scroll-sawing machine, of the variety known as "spring" machines, for the reason that springs are employed in giving the requisite tension to the saw-blade, without the drawbacks well known as incident to the use of the old method of securing the saw in a cumbrous frame. This apparatus differs from others of its class in not requiring any support back of the saw, the strain or tension exerted thereon being sufficient to insure the proper performance of its work without the aid of such an appliance. The saw, furthermore, is simply hooked at top and bottom, whereby it is fitted for the most speedy and convenient removal when required.

The engraving represents the machine as set up for use. The manufacturers furnish the following sketch of its construction, operation, and the advantages claimed for it:—

A, A, are two steel spiral springs. Each spring contains ten coils of 1/8 or 5/8 round steel rod, one being a right hand, the other a left-hand coil, the two aggregating twelve feet in length of steel. One end of each of these springs is firmly fastened to the ratchets, B, B, the opposite ends to the front end of the lever, F, which is supported upon the shaft passing through the center of the springs, and so constructed that there is no friction upon any part of the springs when in motion. The link, H, which is of iron, connects the upper lever, F, with the lower lever, G. These levers are so connected that, when the saw is moving a 5-inch stroke, the first coils of the springs, A, A, move but 1/8 of an inch, the second coils but 1-9th of an inch, and so on down to nothing, making the average movement of the coils but 1-16th of an inch. The upper cross-head which carries the top of the saw is firmly connected to the lever, G, thus making a positive connection between the saw and springs. This insures a perfectly rigid strain on the saw. By means of the ratchets, B, B, and lever, C, any amount of strain can be given from 10 to 75 lbs., according as it is a small or large saw. This is done by taking hold of the lever, C, which is inserted into the sides of the ratchets, B, B, and thus winding or unwinding the springs, A, A. Each spring and ratchet is independent of the other, so that one or both springs can be used. The tension on the saw by this means can be changed in a moment while the machine is in motion. A plunger-pump is attached to the inside of the iron plate, D, D, with a rubber pipe running to the saw, and is worked by the motion of the lever, G. The two springs with all their connections are permanently fastened to the iron plate, D, D, which is raised or lowered to suit any length of saw by means of the crank, E, and held in position by the thumb-screw, O. Its advantages comprise its high rate of speed, which is from 800 to 1,000 per minute without jar; unusual strength and durability of the two springs employed, giving from 10 to 75 lbs. strain on the saw, while the average movement of the coils is but 1-16th of an inch. Also, the motion of the springs being so slight, the variation in the tension on the saw is less than 1/8 of a pound, thus enabling the lightest saw to be run without breaking. Also, the raising and lowering of the springs with all their connections, thus bringing the lifting-power of the springs directly to the top of the saw, no matter what its length. Also, the simple and complete mode of changing the tension of the saw, which is done as above described in a moment of time, without stopping the machine. Also, the construction of the springs and their connections with the saw is so arranged as to bring the strain of the saw in a direct line with the bolt, fastening the machine to the joist overhead, so that, if the three braces shown in the cut be removed, and leave it suspended upon one single bolt, it does not shake enough to jar the sawdust anywhere on the machine when running 1,000 motion; with further reference to this improved saw it may be mentioned that the judges of the late American Institute Fair in their report declared the apparatus to be "strongly made, easily adjusted, and can be run at a high speed without trembling," and that "for convenience in operation and adjusting they think it unsurpassed."



BEACH'S SPIRAL-SPRING SCROLL-SAW.

For further information address the manufacturer, Henry L. Beach, office 90 Fulton Street, New York City, where the machine can be seen in operation.

MICHIGAN made nearly 100,000 tuns of pig-metal last year, against 900 tuns in 1854.

Land Reclamations on the Pacific Coast.

THE Anglo-American Land Reclamation Syndicate, whose property is swamp and overflowed lands in California, was recently examined by Mr. Eastwick, M.P., and his English associates, have now secured control of all the marsh lands in the State, which they propose to reclaim by a very extensive system of sea-walls, levels, and draining ditches. These, together with adjoining uplands taken up by the Syndicate, amount to half a million acres. Prominent civil engineers and capitalists having endorsed the scheme, the practicability of which is established by success of similar though less extensive reclamations, the enterprise and its prospective benefits to the State are attracting much attention. The company will commence operations immediately on the great delta inclosed by the Sacramento and San Jonquin Rivers.

Iron Railway Ties in Belgium.

THE wrought-iron ties in use on several of the Belgian railways are giving great satisfaction. The rails with which these roads are laid are 4 7/8 inches deep, with 2 3/4 inches head, and 4 1/8 inches base, with fish-joints, and secured by 4 3/4 inch bolts. The iron ties are simply rolled I-beams, 8 feet 5 inches long, placed 8 feet between centers. Between these and the rails, oak blocks, 10 inches long, and 6 1/4 by 2 1/4 inches in the cross-section, are interposed, and rails, blocks, and ties are securely held together by the wrought-iron bolts before described. This plan has many advantages, and commends itself as worthy of the consideration of those whose objections to iron ties are based upon their want of that elasticity which is peculiar to wood.—*Exchange.*

Torpedo Trial.

A LARGE number of persons assembled at the Navy Yard (Philadelphia) on Saturday, March 16, to witness the explosion of a torpedo designed for sinking vessels. The torpedo exploded on Saturday consisted of a cast-iron cylinder, rounded at one end, and containing about 115 pounds of powder. It was adjusted to one end of a spar, about thirty feet long, and the other end of the spar being connected by a bolt to the stern of the United States steamer *Powhattan*, a short distance above the water-line. A wire from a battery on deck communicated with the torpedo. The torpedo was sunk to the depth of from ten to twelve feet, and, when the explosion took place, a heavy column of water was forced up to the height of some forty feet, and the concussion was so great that it was very sensibly felt along the whole line of the pier and on board the steamer. The opinion was expressed by naval engineers and others that such an explosion under the bottom of a vessel would most certainly sink it. A large number of fish killed by the concussion were seen soon afterwards floating upon the surface of the water.—*Philadelphia Ledger.*

THE authorities of Chicago have discovered that small wooden houses are built on rollers in the West Division, and quietly wheeled across the line of the fire limits, thus evading the new regulations.

AMERICAN ARTISAN

BROWN, COOMBS & CO., Publishers.

ISSUED WEEKLY AT

No 189 Broadway, New York.

H. T. BROWN. J. W. COOMBS.

AGENTS.

AMERICAN NEWS COMPANY..........New York City
NEW YORK NEWS COMPANY.......... do
NEW ENGLAND NEWS COMPANY..........Boston.
A. WINCH & Co..........Philadelphia.
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WEDNESDAY, MARCH 27, 1872.

THE AMERICAN MITRAILLEUSE IN ENGLAND.

ON page 153, Vol. XI., of the AMERICAN ARTISAN, we expressed the opinion that the successful mitrailleuse must necessarily be on "the American or Gatling system, and not on that of France, Belgium, or Prussia." The soundness of this view is confirmed by our latest files of English journals, which detail the experiments at the proof-butts of the Royal Arsenal at Woolwich, made with the "Gatling battery gun," recently constructed by Sir William Armstrong, with a view to its introduction into the British service. Charged with three hundred and fifty-two cartridges, the machine was fired at the rate of four shots per second, and even rose at times to five and one-half per second. The effect is described as most destructive. With a target thirty feet square, at nine hundred feet range, with an elevation of forty minutes, single shots in succession struck close to the bull's eye. At distances of five hundred, eight hundred, and one thousand yards, the results, both with single shots and rapid firing, were pronounced equally successful, and, what is of quite as much consequence as accuracy of fire, there were no misfires. Aside from some suggested improvements designed merely to enable the feeding of the cartridges to be performed with less power, the apparatus seems to need no further modification to make it satisfactory to our, by no means easily contented, transatlantic neighbors.

DANGER IN THE FOOT-LIGHTS.

ON the evening of March 15, the opera-house in our neighboring city of Newark, N. J., was the scene of a narrow escape to two young girls who were acting in an allegorical play, clad in the light and flimsy drapery common upon the stage. One of the children stepped too near the foot-lights, and in an instant the airy fabric of her dress was aflame, and quickly set fire to the one next to her. Both were severely burned, and at the hour of our present writing the death of one is looked for. Instances of this kind are not uncommon, but, despite that efficient means of prevention are well known, no care seems to be taken at places of amusement to avoid the danger. Ordinary gauze catches like tinder at the first touch of flame; but if permeated during the starching process with any one of several well-known salts, anything more than a smouldering, creeping fire, comparatively devoid of danger, is impossible.

But there is little good in cautioning employees, whether in theaters, workshops, or mines, against danger, or in pointing out to them the best methods of guarding against casualties; for experience shows that they commonly prefer to take the risk and suffer the consequences. Responsibility for their safety is therefore, as a matter of fact, thrown upon those having control of the immediate conditions under which danger is incurred. It is for this reason that we have advocated stringent legislation to compel mine owners to furnish safety appliances to their mines; steamboat owners to provide for the more careful examination, testing, and repair of boilers and engines; and managers of manufacturing establishments to box in belting and gearing wherever liable to come in contact with operatives or others. By a parity of reasoning, we are led to believe that those having the management of theaters should be obliged to afford some other mode of illuminating the stage than that which brings the penalty of death or injury for a careless step, like that just above recorded. Indeed, from the number of so-called accidents from foot-lights which have occurred during the past few years, it is to be wondered at that no better devices have been substituted in their place, and, if none such have been devised, it is time that inventors were urged to produce something of the kind, and theater managers compelled to adopt it.

TROWEL BAYONETS.

ALTHOUGH the soldiers of Sir John Moore made the midnight burial of their chieftain, the "sod with their bayonets turning," there exists in the popular mind not the remotest connection between a bayonet and a shovel. Yet those conversant with military affairs bear witness to the desirability of furnishing soldiers with some means whereby intrenchments may be readily thrown up without adding either to the outfit of the soldier on the march or to the appliances embraced in the usual equipment of an army. We believe that originally it was an American idea to so shape a bayonet that its use for the purpose just indicated would be practicable, although the same suggestion has, within a recent date, been advocated abroad. At all events the most reliable and efficient tests appear to have been lately made in this country with Rice's Trowel Bayonet, at Fort Leavenworth, Kansas. Among other trials is that reported by Major-Gen. Miles. In this "a company in single rank, working in a soil of medium hardness, threw up, in a space of ten minutes, a work along its entire front of sufficient height and thickness to protect a line of battle. The work was tested, and found to be bullet-proof against the Springfield breech-loader; at a distance of twenty paces the balls would not penetrate through half the work." So much for the utility of the device as an intrenching tool. Whether its slightly greater weight than the ordinary bayonet will, as in the case of the sword bayonet, militate against its general use as an infantry arm, can, of course only be determined by actual test in the exigencies of a long campaign. But that the improvement has the elements of great usefulness seems to be apparent, and it is quite likely that, slight as it may seem, it may hereafter play an important part in modifying the management of troops in the face of an enemy.

A COMPROMISE GAUGE.

THERE is a story of a careful householder who, wishing to fit his dwelling for the convenient ingress and egress of a large cat and a small kitten, made in the wall a large hole for the one and a smaller hole for the other. The same "essential principle" is proposed by one Mr. R. A. Wilder, styled by the Springfield *Republican* "a Pennsylvania engineer," for application in the construction of railways. Possessed of a spirit favorable to compromise, he suggests a narrow, common, and wide gauge all in one; this to be brought about by laying two parallel narrow-gauge lines, with the distance between them corresponding to the usual width of track. Light locomotives are to traverse the narrow-gauge; those of ordinary weight and size on the track formed by the two innermost rails; and cars with four longitudinal lines of wheels, one to each of the four rails, are to have a width of seventeen feet, and run at fabulous speed, with no oscillation at all.

No engineering scheme, however meritorious in itself, can be suggested without being immediately seized and brought to a *reductio ad absurdum* by some one wholly unaware of the conditions involved; but one could hardly have expected to find the narrow-gauge coupled with cuts and embankments of nearly twice the common width, or the use of ordinary locomotives on rails of the diminished weight which are necessary to secure economy in the construction of the narrow lines. It is somewhat out of the way that the *Republican* should express a *quasi*-approval of the plan, which suggests that perhaps one of its editors has been switched off from his regular duties and caused to enter a quite unfamiliar field.

PRESERVING GRAIN, ETC., IN VACUO.

THERE can be no doubt that, if grain could be kept at a uniform temperature in chambers exhausted of air, it would be preserved much better than in any ordinary form of granary. But it is doubtful if receivers constructed at a cost of one hundred and fifty dollars for every three hundred and fifty cubic feet of capacity would, under usual conditions, be found sufficiently economical to meet with favor. Not so, however, thinks M. Louvel, who has brought before the French Academy a plan of storing wheat in portable sheet-iron granaries, in which a vacuum is maintained equal to at least from three to four inches of mercury, this being found sufficient to destroy all insect life (although a much more perfect vacuum is preferred) and to insure the evaporation of any moisture in the grain. The apparatus is of cylindrical form, placed vertically, and with convex top and bottom. The top is provided with an opening through which the inlet of the grain is had, with a valved pipe through which the air is exhausted, and with a gauge by which the degree of exhaustion is indicated. The grain is removed through an opening (provided with a suitable closing device) in the bottom. The pump, which can be used for any number of the grain receivers, costs about one hundred and eighty dollars extra. In one experiment, where living insects were introduced in large quantities with the grain, it was found that they were all killed before doing mischief, and at the end of six months the wheat was found to be in as fine condition as at the outset. It is not likely, for the reason just previously indicated, that this plan will come into much use for keeping grain, but there are manifestly some very plausible reasons why it should be tested for the preservation of bread, biscuit, and the like, on shipboard and under other similar conditions.

EIGHTEEN hundred vessels are employed, irrespective of railroads, in conveying 5,250,000 tuns of coal annually to warm the city of London.

NEW PUBLICATIONS.

THIRD ANNUAL REPORT OF THE BOARD OF RAILROAD COMMISSIONERS OF THE COMMONWEALTH OF MASSACHUSETTS. January, 1872.

This Report is divided into three parts, the first relating to matters of local or temporary interest concerning the several railways of Massachusetts; the Revere collision, the action taken by the Commission in consequence thereof, and the results of an investigation into the cause of railway accidents, and the most efficient means of prevention; and the general matters of fares, freight, general public policy relating to railways, etc. To those interested in the subject to which it pertains, and who appreciate the value of the exact information frequently contained in dry public documents, the Report in question will be of use.

THE PRACTICAL METAL-WORKER'S ASSISTANT, comprising metallurgic chemistry, the arts of working all metals and alloys, forging of iron and steel, hardening and tempering, melting and mixing, casting and founding, works in sheet-metal, the processes dependent on the ductility of the metals, soldering, and the most approved processes and tools employed by metal-workers. With the application of the art of electro-metallurgy to manufacturing processes, collected from original sources, and from the works of Holtzapffel, Bergeron, Leupold, Plumier, Napier, Scoffern, Clay, Fairbairn, and others. By Oliver Byrne. A new, revised, and improved edition, to which is added an appendix, containing the manufacture of Russia sheet-iron. By John Percy, M.D., F.R.S. The manufacture of malleable iron castings and improvements in Bessemer steel. By A. A. Fesquet, chemist and engineer. With six hundred and nine engravings, illustrating every branch of the subject. 683 pp. Price $7. Sent free by mail to any part of the United States. Philadelphia: Henry Carey Baird, Industrial Publisher, 406 Walnut Street.

UNIVERSAL STATISTICAL TABLES.—The publishing-house of L. Prang & Co., Boston, have brought out "Schem's Universal Statistical Table," at the nominal price of 25 cents. It is a publication containing the most important statistical facts relating to *all the countries of the world*, such as the area of each country, form of government and head of the same, population, expenses, debt, paper money, amount of circulation, standing army, navy, merchant-vessels, imports, exports, chief produce, coins and their value in gold, weights and measures, railroads, telegraphs, capitals and principal cities, together with number of inhabitants, etc., etc.

SOPHISMS OF FREE TRADE AND POPULAR POLITICAL ECONOMY EXAMINED. By a Barrister (Sir John Barnard Byles, Judge of Common Pleas). First American from the ninth English edition. Price 75 cent. Sent free by mail to any part of the United States. Philadelphia: Henry Carey Baird, Industrial Publisher, 406 Walnut Street, Philadelphia.

Sale of a' War-vessel.

THE Vallejo *Independent* says:—"We learn that the steamer *Vanderbilt*, which has been lying in the stream between this city and Mare Island over four years, will be sold at auction within the next ninety days. The *Vanderbilt*, which was believed to be the fastest ship afloat, was presented to the Government during the rebellion by Mr. Vanderbilt, of New York, for the express purpose of running down and capturing such Confederate cruisers as the *Shenandoah* and *Alabama*, in which service she was for some months engaged, but never succeeded in overhauling any of them. She was capable of making sixteen knots an hour; but it took a coal-mine to supply her with fuel, as we are informed she would consume from seventy-five to one hundred and forty-two tuns of coal per day. Besides the expense incurred in housing her in, she has cost the Government, during the past four years that she has lain idle here, from twenty dollars to thirty dollars a day. Her engines alone cost one hundred and fifty thousand dollars, and it is not likely that she will bring when sold more than half that sum."

Some Iron Statistics.

FIVE years ago Illinois did not produce a tun of pig-metal. Last year she made 65,000 tuns.

Last year Missouri mined 268,800 tuns of iron ore, and Michigan 910,984 tuns.

Nearly one-third of the pig-metal produced in the United States is made from Michigan ore.

Illinois as a rail-producing State is second only to Pennsylvania.

About 3,500 tuns of "black ore" are mined in Clay County, Indiana, every day, part of which is sent to St. Louis.

One mill in Wisconsin places that State fifth on the list of rail-producing States. It made 25,774 tuns last year.

The Missouri ore companies are preparing to put 500,000 tuns of ore in the market this year.

The manufacture of rails in this country has doubled in the last six years.—*Miners' Journal*.

More of Darien.

THE President has appointed a Board of Commissioners to examine and report upon the various plans and surveys for a canal across the Isthmus. This Board consists of Gen. A. A. Humphreys, of the United States Engineer Corps, Prof. Benjamin Pierce, of the Coast Survey, and Capt. Daniel Ammen, of the Navy. It is to examine all the different projects, analyze the results of the different exploring expeditions, and report upon the most feasible route, with the probable cost of construction. Capt. Selfridge, it will be remembered, has already made two examinations of the Isthmus of Darien; Capt. Shufeldt, has explored the Tehuantepec route; and Commander Crossman is now under orders to lead a new expedition to Nicaragua.

Gas-engines.

IN engines which employ an explosive mixture of air and gas for the motive force, a limited quantity of the explosive mixture is held in reserve under the pressure of several atmospheres in a reservoir in connection with the engine. In one recently devised in England, a suitable arrangement of valves and gearing, a charge is admitted into a chamber immediately connected with the cylinder, and forced through the meshes of a series of wire-gauze diaphragms. A lambent flame is kept burning upon the surface of the gauze diaphragms by gas, and this ignites the successive charges. The diaphragms prevent the return of the flame. Thus the gaseous mixture exerts a true pressure due to expansion upon the piston.

IT is said that a basis has been agreed upon between the existing Atlantic telegraph companies by which the French Cable Company undertake to lay a new cable between Great Britain and the United States.

Possible Improvement in India-rubber.

MR. GEORGE AUGUSTUS SALA, a well-known English magazine writer, is reported as describing the man Tichborne (who has just failed to establish his claim to a British baronetcy) as one who "for any passion or emotion that he showed might have been made of galvanized india-rubber—sluggishly elastic, moderately susceptible of pressure, and then quietly returning to his normal state." Either Mr. Sala is aware of something new in the rubber manufacture, or ignores the difference between coating metals with zinc and treating elastic gums with sulphur.

Foreign Honor to an American Scientist.

THE Geological Society of London recently gave the Wollaston medal for 1872 to Prof. James D. Dana, of Yale College. This medal was founded in 1828, by William H. Wollaston, in his day one of the most distinguished scientific men of England, and is given only to those of the highest attainments in geological and mineralogical studies. It is made of gold, and has on one side the head of Wollaston, and on the other the name of him to whom it is given.

A WRITER in the March number of the *Handicraft* says he has "succeeded in making quite a powerful series of half a dozen elements, by using old fruit-jars holding about a quart. The copper pole was formed in the first place of heavy tea-lead, which coats but little and is easily molded to any form. As the power of the battery depends largely upon the extent of surface exposed by the copper, he folded the lead in ridges, thus obtaining a large extent of surface at the bottom of a comparatively small jar. He did not go to the cost of having zinc poles cast, but simply took a quantity of zinc fragments, coated them well with mercury, and piled them on a slice of wood, cut endwise off a block, and bored full of holes. The wood and its load were suspended by cords, which were tied round the mouth of the jar. By using large jars it is possible to construct batteries of any power that may be required in the arts, and in this way odd scraps of amalgamated wire, that would otherwise be wasted, may be readily utilized. It may be added that lead, thin sheet-brass, and even common tin-plate, may be employed for the copper pole of Daniell's battery, and will give quite good results.

THE great pyramid weighs 12,760,000,000 tuns, if anybody wants to know. According to Herodotus, it took the labor of 100,000 men twenty years to build it. To show the mechanical value of modern improvements, Dr. Lardner affirms that 480 tuns of coal, with an engine and hoisting machine, would have raised every stone to its position.

THE making of plate-glass was suggested by the fact of a workman happening to break a crucible filled with melted glass. The fluid ran under one of the large flagstones with which the floor was paved. On raising the stone to recover the glass, it was found in the form of a plate, such as could not be produced by the ordinary process of blowing.

THE value of the steamboats now in use on the Western rivers is placed at $22,643,500, and that of barges at $5,769,400. Of the steamboats, St. Louis is interested to the amount of $5,428,800, and the barges at $834,000. The total tunnage capacity of the steamboats and barges now on the Western rivers is estimated to be 803,844,000.

ON THE APPLICATION OF ELECTRICITY TO THE REGULATION OF RAILWAY TRAFFIC.

BY F. L. POPE, ELECTRICAL ENGINEER.*

If we consider steam, the almost universal motor, as the muscle of modern mechanism, we may with equal propriety regard electricity as its brain. The want of success which has attended the numerous attempts which have been made during the past thirty years to utilize electricity as a motive power has served to indicate to the more thoughtful class of its inventors that its true function, as applied to machinery, is not that of a prime mover, but rather that of a guiding, controlling, and supervising intelligence, almost rivaling that of the human mind itself. Viewed in respect to this, its manifestly appropriate sphere, the number and variety of its probable and possible applications in the future are almost beyond computation. In fact, the cultivation of this vast field can scarcely be said to have fairly been commenced.

I propose, in this paper, to give some account of the progress which has been made in the development of one of the most important of these applications of electricity—that of the supervision and control of the movements of trains upon railroads.

The peculiar fitness of this mysterious agency for this work is at once apparent upon the most casual consideration of the subject. On a railroad whose trains are moved by telegraphic orders, the official who directs their movements is rendered practically omnipresent. He is virtually everywhere at the same time, and he can make his arrangements and carry them out with as much certainty as if every train were within the reach of his vision and within the sound of his voice as he sits at his desk.

The first railroad in this country which provided itself with a telegraph line devoted exclusively to the business of the road was the New York and Erie. A single wire was put up about the year 1850, between Piermont and Dunkirk, which was at first employed merely for the transmission of communications to and from officers, employees, etc. Ordinary public business was also transacted to some extent, as opportunity offered. The idea of its being practicable or safe to employ the telegraph for the movement of trains does not seem to have originally occurred to any of the officers of the road. Upon one occasion, some time during the year 1851, Mr. Luther G. Tillotson, who was then superintendent of the telegraph line, together with the division superintendent of the railroad, were in the telegraph office at the depot in Elmira. The express train from New York, though due, was known by means of telegraph to be about four hours late, and certainly not within a hundred miles of Elmira. An eastward-bound stock train lay on a siding at Corning, eighteen miles west, waiting for the express to pass. A westward-bound freight train at Elmira was also waiting for the express. It was no uncommon occurrence for freight trains to be held in this way for hours and even days by belated passenger trains. In fact, it is vouched for as an actual occurrence that a third-class train on the Erie road once lay on a siding at Union station for a whole week before it could get away according to the rules. On the occasion in question, it occurred to Mr. Tillotson that the stock train might be ordered to Elmira, and the freight sent forward to Corning, thus saving thirty-six miles of running time, and the whole operation be completed long before the arrival of the express. But this idea was so utterly without precedent that the superintendent could not at first be prevailed on to give the order, even when Mr. Tillotson urged that there could be no possible danger even if the express *did* arrive in the meantime, as it could be detained at Elmira until the arrival of the stock train. Finally it was determined that the superintendent should detain the express at Elmira, in case it unexpectedly appeared, and also order the freight to go ahead as far as Corning. Mr. Tillotson accompanied the freight train, armed with a written order from the superintendent to bring back the stock train, which was accomplished without difficulty long before the arrival of the express.

The success of this experiment was encouraging, and led to the next step, that of transmitting the orders by telegraph to the conductors of the trains. After this had been done a few times without accident, Mr. Tillotson suggested, as a further precaution, that each conductor receiving an order for the movement of his train should telegraph back his understanding of the order before being allowed to execute it, which was accordingly established as a rule. This was the origin of the American system of train dispatching, which was first adopted on the Susquehanna Division of the Erie Railroad, and soon after on the entire line. The credit of its general adoption upon the Erie road is due to the late Charles Minot, who was then general superintendent. To those familiar with the history of such improvements, it is almost superfluous to state that the most strenuous efforts were made to prevent its introduction, not only by nearly all the other officers of the road, but by the conductors and engineers, some of whom went so far as to sacrifice their situations rather than to submit to such an innovation as that of running against the time of another train on telegraphic orders. The trepidation and alarm manifested by some of these conservative gentlemen upon the general adoption of the system was a source of infinite amusement to th telegraphic operators.

In his report to the stockholders made in 1855, after the system had been in use for four years, the general superintendent referred to it as follows:

"A single-track railroad may be rendered more safe and efficient by a proper use of the telegraph than a double-track railroad without its aid; as the double track can only obviate collisions which occur between trains moving in opposite directions, while the telegraph may be effectually used in preventing them either from trains moving in an opposite or in the same direction.

"I have no hesitation in asserting that the single-track railroad, having judiciously located turn-outs equal in the aggregate to one-quarter of its entire length, and a well-conducted telegraph, will prove to be a more safe and profitable investment than a much larger sum expended on a continuous double-track operated without a telegraph.

"In moving trains by telegraph, *nothing is left to chance.* Orders are communicated to the conductors and engineers of the opposing trains, and their answers returned, giving their understanding of the order, before either is allowed to proceed.

"It would occupy too much space to allude to all the practical purposes to which the telegraph is applied in working the road, and it may suffice to say that without it the business could not be conducted with anything like the same degree of economy, safety, regularity, or dispatch."

The system, having once become thoroughly established upon the Erie road, gradually extended itself Westward upon the principal through routes, so that at the present day there are few railroads west of New York of any importance which are not operated in this way. Singularly enough, the notorious conservatism of the New England railroad managers has thus far prevented any of them from employing the system at all, with the single exception, I believe, of the Vermont Central road. A vast amount of money might have been saved in some instances, which has been needlessly expended in the construction of a second track through a mountainous and difficult country, many years before it would have become a necessity, had a proper system of controlling the trains by telegraph been introduced.

The general principle on which trains are moved by telegraphic orders, on all single-track roads, is the same; although, as might naturally be expected, considerable diversity exists in regard to the details. It consists, primarily, in concentrating the entire responsibility, as far as practicable, in the hands of one person, who is officially known as the train dispatcher. Through the agency of the telegraph, the train dispatcher, as I before remarked, becomes virtually omnipresent. No irregular engine or train is permitted to move upon the road without his knowledge and his direction, and every train, whether regular or otherwise, is at all times subject to his orders. His authority is absolute, and his instructions must be obeyed fully and to the very letter. He is required to have a thorough knowledge of the rules of the road and their practical working. He must be familiar with the character of the road itself, the location of its grades, the location and capacity of sidings and passing places, the power of the different locomotives, and all the apparently endless details of its operation, in order that he may issue his orders intelligently when an emergency arises. The dispatcher is in all cases an expert telegraphic operator, and during the hours he is on duty sits at the instrument, personally sending and receiving the telegrams by which the movements of the trains are regulated. He has before him a copy of the printed time schedule of the road, on which the different trains are distinguished by numbers, those going in one direction having even numbers, and those going in the other direction odd numbers. He also has a corresponding blank schedule, properly ruled, called the "train sheet," in which the actual time of the arrival, passing, or departure of every train is set down as reported by the operators at the stations along the line. In all communications relative to the trains, they are invariably referred to by their distinguishing numbers.

Each station along the line is provided with a colored day and night signal for stopping trains, placed in a conspicuous position, so as to be seen by the engineer when approaching from either direction, and capable of being managed by the operator without moving from his instrument.

The movements of the trains are theoretically governed by certain rules printed upon the time schedule. Whenever a train fails to make its schedule time from any cause, then the dispatcher takes it in hand. He arranges the meeting and passing points according to circumstances. The telegraphic order is always issued first to the train having the right of the road, and then to the opposing train. When the proper responses are received, the dispatcher replies by a signal signifying "correct," and the trains move forward as directed. If it becomes necessary to stop a through train at some station to await the arrival of an

* Paper read before the New York Society of Practical Engineering, March 13, 1872.

opposing train, an order is issued to the operator to "Hold No. —." The operator first turns on his signal, and then replies, "No. — is held." When the train in question comes up, the engineer observes the signal, and stops until allowed to go forward by the dispatcher.

The amount of time and money saved to American railroads by the use of this system is almost incalculable. Some idea of the extent to which it is used may be inferred from the fact that there were sent from the dispatcher's office of the Michigan Central Railroad at Kalamazoo, during the month of January, 1871, more than 16,000 distinct train orders, or an average of about one order every three minutes, including nights and Sundays!

Three or four years ago, a system differing altogether from the one which has just been described was introduced on the line between New York and Philadelphia, by Ashbel Welch, Chief Engineer of the United Railroads of New Jersey. This line having a double track the entire distance, the danger more especially to be guarded against was that of collision between trains going in the same direction, and the system under consideration was arranged with particular reference to this fact.

On the New York and Philadelphia route, telegraphic signal stations are established at intervals somewhat less than the shortest that are permitted between trains moving in the same direction, averaging perhaps two and a half or three miles apart between Jersey City and New Brunswick. South of New Brunswick, where there are fewer trains, the stations are about five miles apart. Each of these stations is provided with a signal placed where it can be seen as far as possible in both directions. This signal consists of a white board by day and a white light by night, shown through a circular aperture, two feet in diameter, in a black signal-box. A partition in the box separates the signals for the opposite directions. The white board or light is ordinarily covered by a red screen. The white or "all-right" signal is exhibited to an approaching train by the operator at the telegraphic instrument pulling a cord. The moment the engine passes he lets go the cord, and the red screen drops by the action of gravity, concealing the white signal.

[*To be Concluded.*]

NEW AMERICAN PATENTS.

WE give, as follows, notices of some of the most interesting inventions for which Letters-Patent of the United States have recently been issued:—

PAWL ATTACHMENT.—N. A. Baker, Covington, Ky.—*March* 12.—The gist of this invention is found in a funnel-shaped sleeve, encircling the axle, used in connection with a lever attachment, whereby it is brought in contact with the pawl by means of a heeled rear shank, holding it out of the ratchet, while the pawl with its attachments continues to revolve.

MUCILAGE HOLDER.—A. H. Fatzinger, New York City.—*March* 12.—This is a mucilage or gumming apparatus, constructed with a round, revolving brush, running in a trough of a fountain bottle in a suitably provided box.

MANUFACTURE OF ILLUMINATING GAS FROM COAL-TAR.—J. Kidd, New York City.—*March* 12.—This inventor claims combining the vapors from coal-tar, or the vapors from distilled coal, or from heavy oils, with the vapor from petroleum naphtha, and then mixing with said vapors a given quantity of superheated steam or heated air, or both combined, and afterwards forcing the mixture through a red-hot retort for the purpose of making a fixed illuminating-gas.

EXTENSION TABLE.—E. Pond, Jun., Woonsocket, R. I.—*March* 12; ante-dated *Feb.* 24.—There is used in this extension table a folding rail, formed in three parts, so arranged that, when folded, such rail shall take the form of an isosceles triangle, its base or middle section lying near the center of the table, and across the transverse division of the table top.

SHEET-METAL CAN.—J. Widgery, Plumstead, Eng.—*March* 12.—This invention comprises attaching and hermetically sealing the cover upon a metal case or box by a soldered joint, so made as that a portion of the covering plate shall overlap the soldered joint, to form an exterior loose or unsoldered lap. Also, in combination with the loose or unsoldered lap of the cover, a ring, loop, or other equivalent device to facilitate the breaking of the soldered joint in opening the box or case.

SMELTING FURNACE.—P. M. Wilson, Brooklyn, N. Y.—*March* 12.—This furnace is constituted by the combination with the furnace proper of rests for supporting the mass of metal in proper position for smelting. The improvement also includes a furnace so constructed that a portion thereof may be removed to admit the heavy masses of metal, and then replaced to make the furnace effectual. Also, in the combination with the furnace and its rests of a double row of tuyere holes, suitably arranged. Also, the combination with the furnace of channels, so arranged that the blast can be controlled and directed upon or against the material in the furnace to the best advantage, and thus contribute to the useful effect of the furnace. Also, the construction of the rests with flanges for holding the fire-brick covering upon them.

FENCE.—A. C. Betts, Troy, N. Y.—*March* 12.—This new article of manufacture is made of longitudinal parallel wires, and pickets provided perpendicular thereto, connected together by staples, and formed in long sections for the construction of wire fence for fastening to posts and splicing the wires of the sections.

HORSE-BLANKET ADJUSTER.—A. Z. Neff, Amsterdam, N. Y.—*March* 12.—This invention embraces the application of blanket-adjusters for horse-blankets, by passing them between and around the hind legs of a horse, and fastened at one end in the under side of a horse-blanket, and at the other end on the outside of the blanket, so as to entirely dispense with a girth around the body, and crupper around the tail of a horse.

ELASTIC GORING FOR BOOTS AND SHOES.—C. Winslow, Boston, Mass.—*March* 12.—This invention, claimed as a new article of manufacture, relates to an elastic goring for boots and shoes, consisting of two surfaces of elastic fabric having an elastic material introduced between the two edges, and their meeting surfaces coated with india-rubber, and the article completed by a process of vulcanization.

CHURN DASHER.—S. E. Bander, Birmingham, Ohio.—*March* 12; ante-dated *March* 8.—This invention comprises, in a churn, the combination with the shaft of adjustable S-shaped dasher-bars, placed reversely on their stem and having their convex edges inclined downward and outward, and their concave edges inclined downward and inward.

FIRE-ESCAPE LADDER.—C. G. Buttkereit, Toledo, Iowa.—*March* 12.—This extension ladder is composed of U-shaped metallic sections, each of which has its ends coiled around the side bars of the next, so that, as occasion requires, the ladder may be contracted or extended. The claim also covers projecting arms, formed on the ends of the sections to more fully insure the performance of the functions thereof.

FIRE-EXTINGUISHER.—J. Gardner, Louisville, Ky.—*March* 12.—The most noticeable feature in this new fire-extinguisher is that it is provided with two or more separate receptacles or chambers (having suitable cocks or valves) for keeping separate an acid in solution, and an alkali in solution in water or any other suitable fluid, and which has all its ventages above the fluid line when the machine is inverted and set aside, but which ventages are all below the fluid when the device is placed in position for operation.

COMBINED TOOL.—T. Garrick, Providence, R. I.—*March* 12.—Aside from minor points, the gist of the novelty in this device is found in a combined boring or piercing implement and cutting blade, extending in opposite directions from the same shank, and provided with an interchangeable handle pivoted to the shank of the tool, and capable of being used either for the knife or pruning implement.

SEPARATING ORES.—A. Huet and A. Geyler, Paris, France.—*March* 12.—This is a novel method of separating ores and other substances, whereby the granulated mass to be operated on is conducted to a sieve covered with an artificial bed of granulated matter, the grains of which are of a larger size than the holes in the sieve, and of a density greater than all of the component substances of the mass except the one having the greatest density, which latter will be caused, by the continued oscillations of the liquid in which the mass is held in suspension, to filter down through the sieve and superincumbent artificial bed into the receiver below.

COFFEE-POT.—W. N. Hutchinson, Wellesbourne, Bideford, England.—*March* 12.—The more salient feature of this novel coffee-pot exists in the use of a liquid-tight cap or cover in the vessel in which the infusions or decoctions are to be made from substances placed therein, which cap or cover is fitted to, or, when working on a hinge, can be pressed against, a perforated or gauze strainer.

MANUFACTURE OF ARTIFICIAL STONE.—T. A. Jebb, Buffalo, N. Y.—*March* 12.—This product is constituted by the combination of sand, hydraulic lime, and dry pulverized soluble glass. There is also claimed as a part of the process of manufacturing artificial stone, the application of a blanket or equivalent fabric or material for covering and protecting the blocks after the molds are removed and before the induration of the cement. The completed blocks are, furthermore, subjected to the action of steam in a closed compartment to facilitate the transformation of the soluble glass and the hardening of the cement.

HOLDER FOR PAINTERS' USE.—S. J. Newell, Dirigo, Me.—*March* 12.—This improvement embraces an upright revolving post, provided with a horizontal revolving vise or holder. Also, in combination with the above of a cog-wheel and latch, arranged to hold the vise at any desired point. Also, certain means for holding the post in any desired position and preventing it from turning.

GAS-BURNER.—Thomas Ward, Columbus, Ohio.—*March* 19.—This invention is chiefly designed for burners used for burning illuminating gas, made by saturating air with vapors of gasoline or other light hydrocarbon. It consists in the novel arrangement of orifices or perforations in an Argand burner to increase its efficiency; also in the combination of an internally screw-threaded and externally tapered thimble with a taper socket, provided at the lower end of the main tube or stem of the fixture, whereby the latter may be securely attached to one of the branches of a gas or kerosene chandelier, or to any other suitable support, without screwing it on or turning it to adjust it.

WHEEL FOR TRACTION ENGINES.—Albert G. Barrett, Barrett, Kansas.—*March* 19.—This invention consists in a wheel having spokes formed of spring-steel in pairs, the bend or junction of each pair fitting in a seat formed for its reception in a cast-iron hub, and the ends of said spokes being secured by pins or lugs to the rim or tread of the wheel.

HOT-BLAST STOVE.—Benjamin Ford, Middleborough-on-Tees, England.—*March* 19.—This invention consists in a hot-blast stove made up of a series of flat stand-pipes of novel construction, and arranged so as to form a wall running in direction of the flow of the heated gases within a chamber or casing, through which said gases pass on both sides of the wall of pipes, the stone being composed of a series of such walls and inclosing chambers forming stove sections arranged side by side, and the pipes being fitted into or resting on separate boxes at their base, and the roof of the chamber being fitted with separate boxes over the stand-pipes. The gas entering at the hot end flows horizontally along the faces of the pipes into vertical flues at the cold end, the gas traveling against the blast which ascends and descends the pipe. In this improved construction there is an increased efficiency in heating the blast, the stove is less liable to get out of repair consequent upon expansion and contraction or from other causes, the facility for repairs and cleaning is enlarged, and

the cost of first erection is less, and the working economy greater than that of other hot-blast stoves.

Loss of the Great Republic.

THE steamer *Denmark*, originally and better known as the *Great Republic*, was abandoned at sea in latitude 32° N., longitude 69° 40′ W., with fifteen feet of water in her hold. The captain and the crew arrived safely at Bermuda in the ship's boats on the 6th inst. The *Great Republic* was one of the most noted clippers of her day, and was regarded as one of the finest specimens of American naval architecture. She was constructed by the celebrated shipbuilder, Donald McKay, at East Boston, and was burned to the water's edge in 1852, on the occasion of the great fire at the foot of Dover Street. She was afterwards reconstructed and rechristened the *Denmark*.

Completion of the Omaha Bridge.

THE Missouri River bridge of the Union Pacific Railroad, at Omaha, Neb., was tested March 13. A train, consisting of a locomotive and ten flat cars loaded with stone, each car bearing thirty tuns' weight, was run across the bridge and back. The test was perfectly satisfactory. The bridge has, says the *Railway Review*, a length (of superstructure) of 2,750 feet, being composed of eleven 250-feet spans resting on one stone abutment, and eleven cylindrical piers, 8½ feet in diameter, reaching to and built *in* the bed-rock underlying the sand at an average of 60 feet below low water. The piers (or, more properly, "columns") are of cement masonry, laid within iron tubes, which were sunk by the pneumatic process, in sections of 10 feet each, the tubes being held together with flanges. The tubes below the water are of cast-iron; those above, of wrought-iron. The thickness of the iron in the former is 1½ inch; in the latter, from ½ inch at the bottom to ⅜ inch at the top. The greatest depth below low water at which any column reached the bed-rock is 82 feet; one column, reaching the bed-rock in 72 feet, was sunk in seven days from the commencement of the pneumatic process (the columns first being sunk into the sand as far as possible by a weight connected with a lever); the greatest descent made in 24 consecutive hours by any one column was 18½ feet. The obstacles encountered in sinking were less serious than was anticipated. The work has been especially fortunate in its freedom from serious accidents to the men, though they were subject while working in the columns to a maximum pressure of 54 lbs. per square inch in excess of the atmosphere. Of 500 men employed in sinking the columns, only two have died from causes directly traceable to the air-pressure.

The superstructure is of the post-truss design, of wrought-iron throughout, except the upper chord, which is of cast-iron. Its weight is one tun per lineal foot; its capacity, in addition to its own weight, is ten tuns to the foot, although it could not possibly be subjected to more than two tuns per foot, a train of the heaviest locomotives weighing but a tun and a half per span. Each span has been tested, as completed, with cars of loaded stone. Before finding its place in the span, each piece of wrought-iron was subjected to a tensile strain of five tuns per square inch of sectional area, which is as great as any portion of the structure would receive under a load of two tuns per lineal foot.

Stone are filled in around each pier to high-water level, to protect it against boats, the ice-breaker column originally proposed having been dispensed with as unnecessary.

On the 13th inst., also, the last span of the great railroad bridge across the Missouri River, at Leavenworth, Kansas, was finished. The track will be laid and trains running over the bridge within two weeks. The Chicago, Rock Island, and Pacific, and Kansas Pacific Railroad Companies intend soon to build a large freight depot and warehouse at Leavenworth.

Chimney Moving.

THE Cabot Company, of Brunswick, Maine, in order to enlarge their cotton mill, moved their large smoke-stack chimney—78 feet high, 7 feet 9 inches square at base, and 5 feet square at top, containing more than 40,000 bricks, and weighing more than 100 tuns—twenty feet, without rollers or balls or guys or braces to steady it—one of the greatest feats ever performed in the State. It was planned and carried out by Superintendent Benjamin Greenes, not one of those engaged having ever witnessed the moving of such a body. It was accomplished by building such ways as are used in launching ships, surfaces planed, greased, chimney wedged up, and moved by two jack-screws in four and a half hours. The flues were disconnected from the boiler at 1 o'clock P.M., and 9½ o'clock the same evening the flues were again connected, fires going, and steam up.—*Boston Com. Bulletin.*

San Francisco Iron-works.

SAN FRANCISCO has fifteen foundries, three boiler-shops, eighteen machine-shops, and four miscellaneous establishments—altogether forty. There are employed 269 molders, 73 pattern-makers, 300 machinists, 54 smiths, 299 boiler-makers, 193 helpers, and 103 boys or apprentices. Mechanics receive from $2 50 to $4 per day (in gold), helpers, $2 to $2 50; and boys, $1 to $1 50. There have been melted 15,726 tuns of pig-iron, at $32 per tun, and used otherwise; 9,053 tuns of wrought and boiler iron, at an average of $120 per tun. The capital invested in the above establishments is $1,484,000, and the manufacture in the last year has been $3,013,000.

Manufacture of Iron Railings, Etc.

MR. J. B. WICKERSHAM, well known in connection with the manufacture of wrought-iron articles, and one of the contractors in building the Crystal Palace in New York City a number of years since, has recently established himself in Philadelphia (No. 1003 Ridge Avenue), where he proposes to carry on the manufacture of iron railings, wire fences, and window guards, iron furniture and iron bedsteads, etc. We understand that he is about to introduce new styles of iron-work of various kinds, in which his experience of twenty-five years in the business will no doubt be displayed in the tasteful design and superior quality of his wares.

THE feat of "Herr Holtum, the Prussian Hercules," who is astonishing the British by catching a ball fired from a cannon, is said to be neither novel nor difficult. The fact is that about two ounces of powder are placed in the gun, then the ball is rammed home, then the balance of the charge is put in. When the gun is fired, all the powder is ignited, and the flash, smoke, and report are orthodox, but the ball receives propulsion only from the small quantity of powder behind it, and is thrown but a few feet.

APPLICATIONS FOR EXTENSIONS.

OPPONENTS of extensions must file *written* objections in the Patent Office at least 20 days before the day-of-hearing; and on that day, at noon, they must appear personally, or by proxy, at the Patent Office, and state the reasons of their opposition. All testimony—*pro* or *con*—must be taken and transmitted in accordance with the official rules, which will be furnished on application. The under-named patentees have recently petitioned for extensions (for seven years) of patents granted to them in the year 1858:—

WILLIAM JOHNSON, Lambertville, N. J.—*Adjustable Hanger for Shafting.*—Patented June 15, 1858; testimony will close on May 14, next; last day for filing arguments and examiner's report, May 24; day-of-hearing, May 29.

JOHN G. BAKER, Philadelphia, Pa.—*Machine for cutting Glaziers' Pins.*—Patented June 15, 1858; testimony will close on May 14, next; last day for filing arguments and examiner's report, May 24; day-of-hearing, May 29.

CHARLES A. BUELL, East Hampton, Conn., and MARGARETTA L. K. BARTON, Worcester, Mass., administrators of JASON BARTON, deceased.—*House Bell.*—Patented June 15, 1858; testimony will close on May 14, next; last day for filing arguments and examiner's report, May 24; day-of-hearing, May 29.

ROBERT J. MANN, Burlington, Iowa.—*Skirt Hoop.*—Patented June 22, 1858; testimony will close on May 21, next; last day for filing arguments and examiner's report, May 31; day-of-hearing, June 5.

SAMUEL FALKENBURY, Susquehanna Depot, Pa.—*Repairing Cast-iron Cylinders.*—Patented June 22, 1858; testimony will close May 21, next; last day for filing arguments and examiner's report, May 31; day-of-hearing, June 5.

ALBERT F. JOHNSON, Parkville, N. Y.—*Sewing-machine.*—Patented June 22, 1858; testimony will close on May 21, next; last day for filing arguments and examiner's report, May 31; day-of-hearing, June 5.

ENGLISH PATENT JOURNAL.

LIST OF APPLICATIONS FOR PATENTS

ON WHICH

Provisional Protections

HAVE BEEN OBTAINED IN ENGLAND BY OR FOR AMERICAN INVENTORS.

[*This list is condensed weekly from the "Journal of the British Commissioners of Patents," expressly for the* "AMERICAN ARTISAN."]

45.—PRINTING MACHINERY.—R. M. Hoe, New York City.—Jan. 5, 1872.

480.—MOLD.—W. Hainsworth, Pittsburg, Pa.—Feb. 16, 1872.

489.—SEWING-MACHINE.—Singer Sewing-machine Company, New York City.—Feb. 16, 1872.

503.—WASHING MACHINE, ETC.—A. G. Myers, New York City.—Feb. 16, 1872.

506.—LEVER PUNCH.—Nathan Thompson, Brooklyn, N. Y.—Feb. 16, 1872.

512.—MANUFACTURE OF POTTERY.—S. R. Thompson, Portsmouth, N. H.—Feb. 17, 1872.

521.—BREECH-LOADING FIREARM.—G. H. Earnest, Springfield, Ohio.—Feb. 17, 1872.

527.—STEAM-BOILER FURNACE.—G. H. Diehl, Chicago, Ill.—Feb. 19, 1872.

529.—LEATHER STIFFENINGS FOR BOOTS AND SHOES.—N. J. Simonds, Woburn, Mass.—Feb. 19, 1872.

531.—SHUTTLE FOR LOOMS.—T. Isherwood, Westerly, Conn.—Feb. 19, 1872.

572.—MANUFACTURE OF LEATHER.—J. C. White, Quincy, Ill.—Feb. 22, 1872.

576.—HOISTING APPARATUS, ETC.—H. Osgood, M. F. Storer, and C. G. Keys, New York City.—Feb. 22, 1872.

578.—STAMPED LEAD-PENCILS, ETC.—J. Reckendorfer, New York City.—Feb. 22, 1872.

579.—FINISHING MARBLE, ETC.—A. S. Gear, Boston, Mass.—Feb. 22, 1872.

AMERICAN COPPER CONSUMPTION.—The total consumption of copper produced in this country is about 25,000,000 pounds, and of that one company, the Calumet and Hecla, produce about 16,000,000 pounds. Its actual cost to that company, with fair profit added, does not exceed 12 cents per pound, and its copper sells at from 22 to 23 cents.—*N. Y. World.*

THE ship *Archibald Fuller* arrived in San Francisco, Cal., on Wednesday, March 13, in one hundred and two days from Liverpool. This is the second best trip ever made; the *Golden Gate* having made it in one hundred days.

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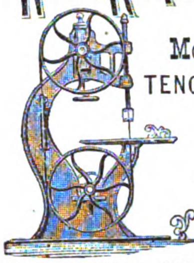

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VOLUME XIV. New Series. } NUMBER 14. NEW YORK, APRIL 3, 1872. { $2 00 PER ANNUM IN ADVANCE. SINGLE COPIES, FIVE CENTS.

CONTENTS OF THIS NUMBER

[Illustrations are indicated by an asterisk.]

Petroleum Trade of Last Year.

THE Titusville *Herald* says the oil trade for 1871, taken as a whole, was very prosperous during the year that has just closed. The product of the Pennsylvania district was 5,790,000 barrels last year, against 5,659,000 barrels in 1870. The value of the yield in this region is set down at 26,000,000. In addition to the product of the Keystone State, considerable quantities were produced in West Virginia, Ohio, and Canada, swelling the total yield of the whole country to the enormous amount of 6,600,000 barrels, an amount greater than that of any previous year.

The growth of the Pennsylvania trade is seen in the following exhibit of the annual yield in each year since 1859:—Production in 1859, 82,000; in 1860, 500,000; in 1861, 2,113,060; in 1862, 3,056,000; in 1863, 2,611,000; in 1864, 2,116,000; in 1865, 2,497,000; in 1866, 3,597,000; in 1867, 3,347,060; in 1868, 3,715,000; in 1869, 4,215,000; in 1870, 5,656,000; in 1871, 5,795,000. Total barrels, 39,301,000.

The average daily production of America in 1871 was 18,100 barrels against 17,000 barrels in the year previous. But it does not appear that the consumptive demand has increased in the same proportion. This is shown from the fact that the stocks on hand are steadily increasing. The increase in the production of America during the year was 103,000 barrels, while the increase in the stock held over from last year shows an increase of 350,000 barrels as compared with the stock in store on January 1, 1871.

Malfeasance in the Signal Service.

IMITATING the Hibernian who condemned the thermometer as "the little baste that made the cowld weather," the *N. Y. World* declares that "it is noticeable that ever since our Signal Bureau has had anything to do with the weather it has steadily and persistently abused its power, and storms and uncanny perturbations have prevailed."

A VALUABLE asbestos mine has been discovered in Georgia. It is being worked to supply packing for car-wheels.

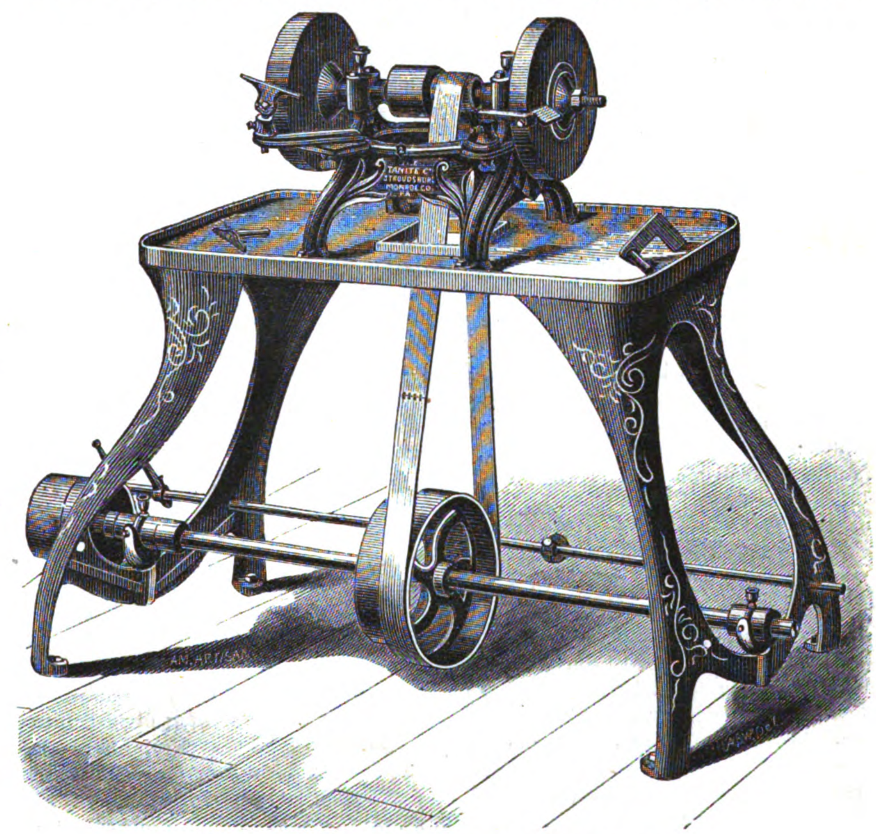
Tanite Emery Grinders.

WE are informed that the chief difficulty in introducing solid emery wheels has been found in persuading busy mechanics to devote the necessary time to put up the fixtures and gearing required in running them. The Tanite Company of Stroudsburg, Pa. (who have recently consolidated their business by the erection of shops for the manufacture of emery grinding machinery), have patented an emery grinder which we illustrate in the accompanying engraving, and the following sketch of the construction and operation of which, and the advantages peculiar thereto, we have received from the manufacturers:—

"There has long been needed a grinder that could be put to work at once as easily as a lathe on a drill, and which would not require tedious manipulation and long delay to get up a stand or table on which to place in, and to arrange counter-shaft, etc., from which to run it. This object has been accomplished by the new table emery grinders manufactured by the Tanite Co. These table emery grinders offer many and great advantages not to be found in machines mounted on pedestals or on wooden frames. The tables and grinders are *complete*. All they need is to be bolted to the floor, and to have a belt attached from the most convenient shaft, the counter and pulleys of the grinder being attached below the table, while tight and loose pulleys, projecting beyond one end of the table, afford every facility for belting. Every one of these machines is furnished, *without* extra charge, with two improved adjustable rests, in addition to the two ordinary ones. These improved rests (shown in the cut as attached to the machine) have such joints that they can be set at any angle, and thus give unusual facilities for grinding bevels.

"The projecting rim of table makes it a suitable place for laying the work to be ground, and adds to its general convenience. The No. 2 machines have cone pulleys, as shown in the cut, while the No. 1 has only single pulleys.

"Whatever doubt may be felt as to the suitability of solid wheels for putting cutting edges on lathe tools, no mechanic who has seen a machine-shop fitted with emery grinders can doubt their great economy for shaping such tools; while the general uses are manifold. Put a half-dozen table emery grinders down in any large machine-shop, so conveniently placed that all can have free access to them, and before a month has passed they will be in almost constant use. Not only will lathe tools all be *shaped* on them, but mandrels, whether steel or iron, that have to be *centered* for the lathes, will be taken to the emery grinder to have the rough ends squared. Nuts and keys will be ground to shape and finished. Castings,



PATENT TABLE EMERY GRINDER.

whose chilled edges or sanded surfaces would spoil a steel tool in a minute, are put into workable shape in less time than it would take to re-sharpen the spoiled lathe tool. A thousand little things that ordinarily would be sent to the vise or the anvil the machinist will do with ease, economy, and speed, if an emery grinder stands conveniently in his room."

Progress of the Hell Gate Improvement.

THE work of removing the obstructions at Hell Gate which was begun about two years ago has been vigorously carried forward with but trifling interruptions, and will, it is now estimated, be completed within a year and a half. One hundred and sixty-five thousand cubic yards of rock were to be removed from the river, and of this amount at least forty-two thousand cubic yards have already been taken out. About two hundred and forty men are now employed in the work, nearly all of whom are Cornish miners of long experience. A much larger number were formerly employed, but the introduction of the diamond drill and the increased use of machinery in all branches of the labor have permitted a great reduction of the working force. A hundred of the workingmen were discharged lately.

The immense bed of rock is now perforated by sixteen tunnels and seven concentric galleries, the floor line of which is thirty-two feet below the level of the river at mean low-tide. It was originally designed to make the channel but twenty-five feet in depth, but subsequently it was determined to render it perfectly safe for vessels of the largest draught. The average height of the tunnels and galleries is twenty-two feet, and their width sixteen, leaving a roof from seven to ten feet thick supported by numerous pillars. The length of the extreme gallery is six hundred feet, and of the grand tunnel two hundred and twelve feet and a half. There will ultimately be twenty-eight tunnel headings, some of which will extend three hundred and seventy five feet.

The work of boring is done wholly by machinery, the laborers serving only to trim and dress the rock after the rougher work has been executed, and to perform the operations connected with blasting. Of the six drills used, two are the diamond-pointed drills and four Burleigh steel percussion drills. The diamond drill is the invention of Rodolphe Leschot, a French engineer, and was first used in the construction of the Mont Cenis tunnel, but is now worked by improved machinery under American patents. The two used at Hell Gate were introduced last October, and have proved so satisfactory that three more will be added in a few weeks. This drill consists of a hollow steel disk an inch and a half in diameter, the rim of which is studded with twelve bits of black carbon. Attached to an iron pipe of the same thickness, it is propelled by compressed air at a pressure of sixty pounds per square inch, and cuts it way through the hardest rock with marvellous rapidity. The motion is rotary, and the number of revolutions seven hundred and fifty per minute. Unlike percussion drills, it receives no wear except from friction, and hence is constantly in working order, and needs no sharpening.

Forty-four feet and four inches have been tunneled by this drill in eight hours through a mass of granite and quartz. By screwing on additional pieces of pipe, it can be propelled in one direction to an indefinite extent, but for blasting purposes it is seldom driven further than fifteen feet. Occasionally, however, through the intervention of a new process in blasting, it is expedient to continue a tunnel of this character for a long distance, thereby effecting a great saving of time. Sand or clay is then rammed into the bore until it is nearly full, to act as a recoil block to the charge, and the rock is blasted section by section.

All the blasting at Hell Gate is done by nitro-glycerine and has been so carefully managed that not an accident has yet occurred. The nitro-glycerine is made into cartridges from eight to fifteen inches in length, about an inch in diameter, and holding from four to eight ounces. They are coated with a glutinous composition which effectually protects them from water. When a blast is made, a little tube of fulminate is attached to the cartridge, and a spark transmitted to it through a wire connecting with an electric battery. Though a large number of cartridges are often discharged in succession with great rapidity, they are never fired at once, as the vibration in this case might seriously jar the stone roof, opening seams for the admission of the water.

The explosions are of tremendous force, shattering the rock into fragments of a size convenient for removal. These are piled on cars drawn by mules, running on iron tracks which are laid in all the tunnels, and conveyed to the shaft, where they are hoisted up by a steam derrick. The masses already taken out form two immense embankments on the river front.

A building near the mouth of the shaft contains three large steam boilers and five compressors, the latter furnishing the motive-power for the drills. In working the compressors lubricating oil is now used instead of water, thereby avoiding the formation of ice in the pipes during severe weather. Near by is a powerful steam pump, which drains all the tunnels comparatively dry through pipes radiating from its base.

Before blasting it is necessary to use great care in ascertaining the line of resistance and quality of the rock, which is chiefly composed of granite, quartz, and gneiss. The stratum embraces a great variety of minerals, however, including, besides various metallic deposits, veins of decomposed feldspar that are as soft as clay. The testing is done with the diamond drill, which in two instances struck sand and water after boring twenty-eight and thirty-four feet respectively, rendering it necessary to abandon blasting in that direction and to have the bores tightly plugged up. In opening tunnel heading No. 3, a section of rock was struck so full of seams that the water poured through the roof at the rate of six hundred gallons per minute. This was effectually remedied by constructing a massive schilt of timber, oakum, and Roman cement, fourteen feet in length by twelve in width.

The work is carried forward almost constantly day and night, the men being divided into gangs which relieve each other at regular intervals. It is executed under the supervision of Major-General John Newton, of the United States Engineer Corps, who planned it from the beginning. The superintendent in immediate charge is G. C. Reitheimer, an engineer of wide experience in various countries, who has devoted himself especially to work of this kind.

When the rock is at length completely honey-combed, and nothing remains but the roof, its supporting pillars, and the outer walls, it will be mined with seven thousand pounds of nitro-glycerine, which is equal in explosive power to seventy thousand pounds of gunpowder. All the charges will be connected by wires with an electric battery in the office of the superintendent, when, at the given signal, it is confidently expected that the whole vast mass will be blown into atoms, which will be entirely removed from the bed of the river.—*N. Y. Evening Post.*

Dredging-vessel on the Mississippi.

THE difficulty that exists at the mouth of the Mississippi River is simply this:—The waters of the river, with its tributaries, drain an area of about three millions of square miles approximately, and the channels of all these streams, stretched out in a continuous line, would make a trough over 22,000 miles long. Much of the region through which these tributaries flow is sandy. Some of it is soft alluvium, where the rains wash away their banks and bear toward the sea their burden of earthy matter. Thus the great Mississippi, receiving all these contributions of sediment, presents a mass of turbid, muddy water, boiling like a caldron, and sweeping along until, checked by the stationary water of the Gulf of Mexico, it drops its freight of sediment, as it were, right at the gate, and the bars thus formed would, if not cleared away by artificial means, effectually obstruct the passage of vessels of any considerable draught in and out of the river. How to counteract this accumulating tendency is the problem. There is a large dredge-boat now at work down there. Another is progressing toward completion, and will probably depart for its field of operations in about six weeks or two months. Just the day before the last Thanksgiving Day, a singular-looking craft slid from the ways at Steers's Yard, Green Point, into the East River. Many wondered what it was intended for. In one respect it was like our ferryboats; that is, it was shaped alike at both ends, but it was too deep and too unwieldy for a ferry-boat, and besides it was apparently intended to have a propeller at both ends. In truth, it was unlike anything that navigates in the waters around New York. After being launched, this strange-looking vessel was towed across to the foot of Ninth Street, East River, where she is receiving her machinery and being fitted for her peculiar service. She is nothing more nor less than a dredge-boat, to be employed in keeping the Mississippi's mouth open. Her name has not yet been divulged by the powers at Washington, by whose order the vessel is being built. Her length is 154 feet 8 inches; depth of hold, 30 feet; and about 23 feet beam. The hull is constructed of live oak, red oak, and yellow pine. She has a screw at both ends—at the after end, one with three blades, twelve feet diameter and fourteen feet pitch, for propelling exclusively; the forward end is provided with a screw also, but something a little different in its aspect. It has six blades instead of three, and looks like a big whirligig. This screw, like the one at the other end, is made of brass; its diameter is the same, and it alone weighs 23,900 pounds. The blades are made separate, and the boat carries extra blades, so that, in the event that any one should break, it can be taken out and a new one substituted. The forward screw performs two offices, viz., that of impelling the vessel through the water by a drawing-on process, and digging in the mud and sand. It is worked by two oscillatings, forty-inch bore by four feet stroke, and will perform sixty-five to eighty revolutions per minute with thirty pounds of steam. The three-bladed propeller is driven by a single oscillating engine, the same size and power with the others. The steam is generated in five tubular boilers, weighing twenty tuns each. These are situated amidship in the

bottom of the hold; the engines to work the propeller are abaft the boilers, and those to work the forward screw are forward of them. The shafts, as well as the other parts of the machinery, are ponderous, corresponding with the nature of the work the boat is to be employed at. Besides the six-bladed screw for digging, there is also a large scoop or drag, in the shape of a half cylinder, made of ⅜ inch boiler-iron, with heavy wrought-iron rims and pinions. It is 12 feet deep, 20 feet concave linear measure, and will drag away fifteen tuns of mud or sand at a load. This scoop is suspended from two strong davits overhanging the digging end of the boat, and is managed by means of a pair of powerful hoisting engines forward. Situated immediately under the boilers are the sinking tanks, of which there are eight, each one capable of holding eighty tuns of water. The actual draught of the boat is fifteen feet, but with the tanks filled it is increased to twenty-three feet, so that she can remove a stratum of mud eight feet thick.

The mode of working is this:—The boat is first driven, light, as far up on the bar or bank as possible. Then the scoop or drag, which hangs suspended from the davits, is let go on the run. Its great weight carries it far into the mud. Then the big six-bladed screw is set in motion, and at the same time the propeller at the other end commences whirling to pull the boat off. The six-bladed propeller loosens up the mud, and adds greatly to the impelling power, which, when both are working, is tremendous, dragging the great scoop, with its freight of fifteen tuns of mud, out to sea.

The dredge-boat is registered at 1,000 tuns capacity, yet she has power sufficient for a vessel of 4,000 tuns, or four vessels of her own size. As the mud is worked away, the sinking tanks are gradually filled, the boat settles deeper in the water, and the digging apparatus works in deeper mud.

The boat is built in the most stanch manner, and is perfectly seaworthy. She is brig-rigged. Her bottom is of solid oak, eighteen inches thick, and will stand any strain to which it is liable to be subjected. When at sea, she will work both propellers, one pulling and one pushing, and it is supposed that her speed will be eighteen miles per hour.—*Cor. N. Y. Times.*

Problems of Telegraphy.

The telegraph engineers of Great Britain have organized a society, of which C. William Siemens has been elected President. From his inaugural we make the following excerpts concerning some of the questions involved in the future progress of telegraphy:—

"Problems of pure electrical science meet the telegraph engineer at every turn: the methods of testing insulated wire, of determining the position of a fault in a submarine cable under various circumstances, or of combining instruments so as to produce recorded messages by the mere fluctuation of electrical tension in a long submarine conductor, are problems worthy of the most profound physicist and mathematician. On the other hand, there is hardly a problem in electrical science that is not of practical interest to the telegraph engineer; and, considering that electricity is not represented at present by a separate learned society, ranking with the chemical or astronomical societies, I am of opinion that we should not exclude from our subjects questions of purely electrical science. The phenomena of electrification and polarization, of specific induction and conduction, the laws regulating the electrical wave, the influences of rise of temperature on conduction, or the potential force residing in a coil of wire of a given form, when traversed by a current, involve questions belonging just as much to pure physical science as to the daily practice of the telegraph engineer, and would, at any rate, be inseparable from our proceedings. Next in order come questions of selection of materials for conduction or insulation, of apparatus for the best utilization of feeble currents, of apparatus for producing, altering, and directing electrical currents, which, although still intimately connected with physical science, call into play considerations of mechanical combinations. This brings us to questions of purely mechanical import, such as the mechanical construction of instruments for recording or printing messages, of protecting and supporting insulated conductors by sea or land, or of constructing machinery for the manufacture, the laying, and the repairing of submarine cables.

"These questions, again, lead up to the more general ones of transport of materials though difficult and inhospitable countries, of navigation, of investigations into the depth and the nature of the bottom of seas, into the nature and effect of sea currents, and so forth, all of which belong, under certain aspects at least, to the province of the telegraph engineer.

"I would go further, and include even statistical information respecting the nature and growth of telegraphic correspondence, without which it is impossible to adapt the construction of lines and of working instruments to the requirements of particular cases. The invention of a telegraph instrument, for instance, is only of practical value, if it is suited to the circumstance of the particular traffic for which it is intended, and to the electrical condition of the lines which it is proposed to work, and when the early pioneers of telegraphic progress elaborated ingenious instruments for sending and recording messages automatically, or for printing them in Roman type, they invariably failed, because the then existing lines were insufficient in every way for such refinement, and the simple needle instrument seemed to suffice for all practical purposes. It was only when the exigencies of the traffic demanded a change that instruments of this nature proved to be valuable inventions.

"In like manner, the long underground lines that were established on the Continent at an early date had to give way to suspended line wire, whereas the present practice and necessities undoubtedly tend toward a reversion to the former, as being less liable to interruption by accident or by atmospheric influences, and because an unlimited number of underground wires may be established between any two stations without encumbering the public thoroughfares. The best mode of insulating and protecting these underground wires with a view to reducing the inductive influence of the one upon the other, and of facilitating access to the one, for the purpose of repairs, without disturbing the others, are questions of practical interest for the present day.

"The electric telegraph is applicable with the greatest positive advantage for the intercommunication between two points a great distance apart; through its agency New York and Calcutta are as near to us in point of time as are the suburbs of our metropolis from one another. It is probable, indeed, that in telegraphing from one suburb to another the message has to be oftener retransmitted than in going from the city of London to India or America, because a direct transmission from any one part of London to another would involve almost an infinite number of line wires in all directions. For this reason there must be a limit to the applicability of the electric telegraph in populous districts, and it behooves us to examine whether another agent may not be preferable in dealing with a traffic of this descripton. The pneumatic tube seems to be well adapted to these circumstances, and, having been first applied for short distances by Latimer Clark, and subsequently modified and extended by others, it will fall within the province of our Society to examine fully into this and kindred methods that may be devised for the rapid interchange of intelligence in towns.

"The questions of field telegraphs and torpedo connections are other branches of inquiry to which we shall have to give our attention, and to these may be added the art of combining secret codes and semaphore signals. These remarks may suffice to show how great is the field for our activity, and how much remains to be accomplished notwithstanding the extraordinary progress of which we are apt to boast."

COMMUNICATIONS

TO CORRESPONDENTS.

We wish our readers to understand that, in freely publishing communications, we do not hold ourselves responsible for the opinions of our correspondents, inasmuch as we may occasionally publish views opposed to our own.

Explosion of Steam Boilers at Pressures Below Proof.

The following correspondence is of interest in connection with a very important subject now prominently engaging public notice:—

New York, March 8, 1872.

Prof. R. H. Thurston:—

Sir:—I have read with interest your article on Boiler Explosions, in the *Journal of the Franklin Institute*. In the discussion of this question in the scientific periodicals of the day, steam users have looked with anxiety for the answer to the question, "Why do boilers explode at a pressure under steam much less than that which the previous water-test indicated would be safe?"

This discrepancy appears in all the experiments at Sandy Hook; but I have seen no effort made to solve it, although, in practical importance, it takes precedence of all others, and is the gist of the whole matter. Respectfully,

(Signed) F. A. Woodson, 243 Broadway.

Stevens Institute of Technology, Hoboken, N. J., March 11, 1872.

Sir:—Your favor of the 8th instant is received. I think that there are several ways in which a steam-boiler may be caused to explode at a pressure lower than that to which it may have been previously tested, as was the case in the third of Mr. F. B. Stevens's experiments at Sandy Hook, although such examples may rarely present themselves.

1st. The boiler may have become so far weakened by corrosion that it may have been barely able to support the test pressure. The interval of time between the application of the test and the explosion may have been sufficient to have allowed

so great additional deterioration as to have reduced the limit of strength to the pressure at which explosion occurred. We have no means of knowing how nearly the hydrostatic test approaches, in any case, the rupturing pressure, and it is very probable that, in some instances, corrosion having reached a certain point, it progresses with accelerated rapidity, and that a boiler which may appear in fair order at the time of the test may, in a short time, become seriously injured.

2d. Braces are often secured by split-pins, and one of these pins may have worked out after an examination and test has apparently shown everything to be in good order. An excessive stress being thus thrown upon neighboring braces, they may have given way, one after another, and an explosion may have followed.

3d. Stay-bolts and braces are fitted and set up while they and the boiler are cold. On getting up steam, the boiler and all its parts expand an appreciable amount, and this expansion must change somewhat the distribution of forces in the boiler, and may thus strain some part that might otherwise have had only the calculated amount of stress to meet.

It frequently happens, also, that the upper part of the boiler has the temperature of the steam, while the lower part has that of the entering feed, two hundred or more degrees lower. This has been known to rupture *new* boilers, and it cannot be doubted that it may have been the immediate cause, in some cases, of explosion at pressures less than that of the previous test.

There may be other ways in which this remarkable and seemingly paradoxical effect may be produced. The above have occurred to me while considering your letter. Very respectfully yours,

R. H. THURSTON.

F. A. WOODSON, ESQ., New York.

SOLAR HEAT.*

BY CAPTAIN JOHN ERICSSON.

[From *Nature*.]

THE calculations presented by Père Secchi, in his work "Le Soleil," relative to solar temperature and solar radiation, tending to discredit the result of recent investigations on the subject, I have carefully examined the "solar intensity apparatus," the indications of which form the basis of those calculations. This unique device will be found delineated on p. 267 of the work referred to, the accompanying illustration (Fig. 1) being a facsimile of the same. It represents a longitudinal section through the center line, thus described:—A B and C D are two concentric cylinders, soldered one to the other; they form a kind of boiler, the annular space being filled with water or oil at any temperature. A thermometer, t, passes through a tube across the annular space, to the axis of the cylinder; it receives the solar rays introduced through a diaphragm, m n, the opening, o, of which is very little larger than the bulb of the thermometer. A thick glass, V, closes the back part of the instrument, and admits of ascertaining whether the thermometer is placed in a direct line with the pencil of rays. The interior cylinder and the thermometer, t, are coated with lampblack. A second thermometer, t', shows the temperature of the annular space, and consequently that of the inclosure. The whole apparatus is mounted on a support having a parallactic movement to facilitate following the diurnal motion of the sun. The apparatus being exposed to the sun, it will be found, on observing the two thermometers, that their difference of temperature increases gradually, and that in a short time it ends by being constant.

Before pointing out the peculiarities of the contrivance thus described by Père Secchi, it will be

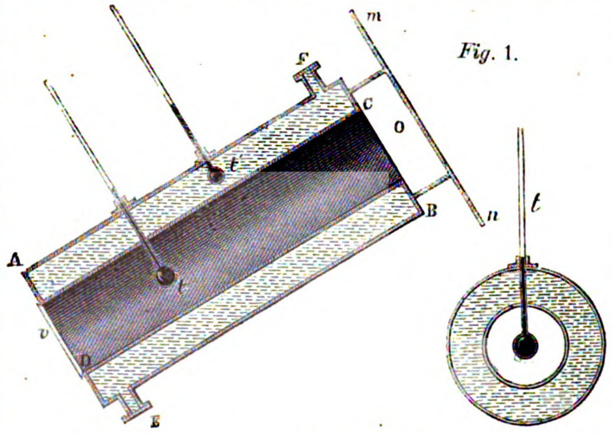


Fig. 1.

instructive to examine his "solar intensity apparatus," manufactured by Casella, represented in Fig. 2. The manufacturer publishes the following statement regarding this instrument:—"Two thermometers are here kept immersed in a fluid at any temperature, and a third, surrounded by the same conditions, but not immersed, is exposed to the rays of the sun. The increase of temperature thus obtained is found to be the same, irrespective of the temperature of the fluid which surrounds it." No one acquainted with the principles which

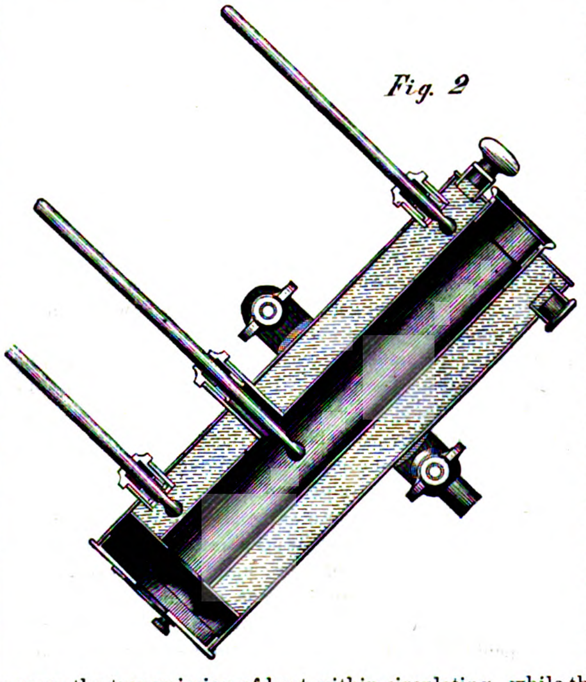


Fig. 2

govern the transmission of heat within circulating fluids can fail to observe that the thermometers applied above the central tube will not furnish a reliable indication of the temperature of the fluid below the same, nor of any portion of the contents of the annular space towards the bottom. Apart from this defect, it will be perceived that an upward current of atmospheric air will sweep the underside of the external cylinder, causing a reduction of temperature of the fluid confined in the lower half of the annular space. Again, the heat radiated by the bulb of the thermometer exposed to the sun will elevate the temperature of the air within the central tube, and consequently produce an internal circulation tending to heat the upper part of the fluid contained in the annular space. The effect of the irregular heating and cooling thus adverted to will be considered after an examination of the result of some observations recorded in Table A, conducted at different times during the month of September, 1871. In order to insure an accurate position, the instrument during these observations was mounted in a revolving observatory upon a table turning on declination axes provided with appropriate mechanism and declination circle. An actinometer being attached to the same table, the true intensity of the radiant heat, as well as the sun's zenith distance, were recorded simultaneously with the indications of the Secchi instrument furnished by Casella. Let us first consider the tabulated observations of September 2, recorded at equal intervals of three minutes. The indication of the two thermometers immersed in the fluid contained in the annular space first claims our attention, since the temperature of this fluid is the principal element in Père Secchi's computations of solar temperature. It will be seen on referring to the second and third columns of the table that, while the upper thermometer indicates a mean temperature of 86·9°, the lower one shows only 79·5°, difference$=$7·4°. This great discrepancy of temperature at different points of the upper portions of the annular space at which, owing to the inclined position of the concentric tubes, something like uniformity ought to exist, suggests a still greater discrepancy of temperature at the underside towards the lower termination of the tubes. In addition, therefore, to the observed irregularity of temperature at the upper part, shown by the table, no indication whatever is furnished of the temperature of the fluid in the annular space below the central tube nor towards the termination at either side. Obviously, then, no accurate computation can be made of the degree of refrigeration to which the central thermometer is exposed by the radiation from the cold blackened surface of the internal tube, every part of which, as we have seen, possesses a different temperature compared with the rest, consequently transmitting radiant energy of different intensity. It will be found practically impossible, therefore, to determine the true differential temperature of the contents of the bulb exposed to the sun's rays and the fluid contained in the annular space. Hence, the differential temperature entered in the table, the result of comparing the indications of the thermometers, is manifestly incorrect. It will be found also by reference to the table, that while the mean temperature imparted to the central thermometer by the sun's rays is 93·1°, the mean temperature of the fluid in the annular space is 83·3°. Consequently, the intensity of solar radiation established by the instrument is only 93·1°—83·3°$=$9·79° Fahr. Now, the sun during the recorded experiment of September 2 was exceptionally clear, the mean indication of the actinometer while the experiment lasted being 60·05°, thus showing that the energy developed was only $\frac{9·79}{60·05}=0·16$ of the true radi-

* We have to call attention to typographical errors in two of Capt. Ericsson's articles hitherto published by us on subjects kindred to that of the present paper. To correct one of these, page 285, Vol XIII., the paragraph ending near the center of the middle column should be made to read, "Already, midway toward the assumed boundary, the density of the solar atmosphere is so far reduced that it contains only 1-152,000th of the quantity of matter contained in an equal *volume* of atmosphere at the surface of the earth." In correction of the other error referred to read "face" in lieu of "fact" in the eighth line from the top on the third column of page 177 of our current volume.

ant intensity. The mean zenith distance, it may be mentioned, was only 33° 24′ during the experiment. Agreeably to the table of temperatures previously published, the maximum solar intensity for the stated zenith distance is 63·35°; thus we find that the sun, as stated, was exceptionally clear while the trial took place, which resulted in developing the trifling intensity of 9·79° Fahr. The result of the experiments conducted September 6, recorded in the table, it will be seen, was nearly the same as that just related, the mean temperature indicated by the thermometer exposed to the sun being 98·2°, while the mean of the two thermometers immersed in the fluid was 87·8°, hence the differential temperature 98·2°—87·8°=10·4°. The mean temperature of solar radiation during the experiment, ascertained by the actinometer, was 59·75°, the zenith distance being 35° 33′. Consequently, the intensity indicated September 6 was only $\frac{10 \cdot 45}{59 \cdot 75} = 0 \cdot 17$ of the true energy of the sun's radiant heat, against 0·16 during the previous experiment. It will be observed that the fluctuation of the differential temperature was much greater September 2 than during the succeeding experiment, owing, no doubt, to the influence of currents of air produced by a strong breeze on the first occasion, the revolving observatory being partially open on the side presented to the sun during observations.

[*To be Concluded.*]

The Earliest Blast-furnace in Ohio.

ACCORDING to a correspondent of the Marquette *Journal*, the first blast-furnace in the State of Ohio was built at Youngstown, by John Struthers and Robert Montgomery, in 1803. It was situated on the banks of the Yellow Creek, and was a very small charcoal furnace, and the iron smelted was used in making pots, kettles, etc., for the settlers, who would otherwise have been compelled to bring them from Pittsburg, through a country which was then an almost unbroken wilderness. Of course no other than what is now known as the native ore was used, and considering the necessarily primitive character of the furnace, and the fact that these ores cannot be made to yield over 30 per cent. of metal in the best hot-blast furnace of the present day, the "make" could not have been very heavy. It was a furnace, however, and made iron—the pots and kettles being cast from the iron as it came from the furnace. Other authorities mention a furnace put up eight years later, in 1811, on Brush Creek, in Adams County, some seventeen miles from the Ohio River. As might be expected, it was of the rudest construction. The stones for its hearth were brought from near Beaver, Pa. The machinery for blowing the blast was driven by water; the yield was about one tun daily of cold-blast charcoal iron. The first furnace with blast driven by steam in the United States is said to have been built in 1819, in Adams County, Ohio.

More Modifications in Gun-cotton.

SOME experiments have been lately made in England with a gun-cotton asserted to be capable of manufacture with any desired degree of explosive power, and of storing without danger of spontaneous decomposition. The inventor accomplishes, as he claims, his object by covering the particles of gun cotton with sugar, with chlorate and potash, or other salts, so as to separate the particles of cotton, and by varying the proportions and quantities of these materials to suit the special explosive quality required. These experiments, however, were simply to test the quality of the cotton as prepared for rifle-shooting as compared with gunpowder. The cartridges contained fifty grains of cotton, and were tried against gunpowder cartridges containing fifty, seventy, and eighty-four grains. The first trial was against a target composed of fourteen pine boards, of one inch thick, clamped together, and at twenty-five yards' distance. In this case, the bullets in each instance passed through all the boards, and splashed against the iron target behind; but at longer distances, up to two hundred yards, the gun-cotton still penetrated, while the gunpowder cartridges, containing seventy and ultimately eighty-four grains, had to be used to effect the same amount of penetration. At five hundred yards the shooting from the shoulder with the gun-cotton cartridges was regular and good.

Electro-deposition of Nickel, Etc.

AN English inventor proposes to give electro-deposited nickel an agreeable color fit for use for ornamental purposes by depositing iron in combination or alloy with nickel from a solution of nickel and iron. To prepare this solution, muriate of ammonia is dissolved in water, and protoxyd of nickel added. The solution is then charged with iron by employing an anode of iron and a current of electricity. In using this solution of nickel and iron for obtaining an electro-deposit of nickel and iron, two anodes, one of nickel and the other of iron, are used. If the deposited alloys give any indication of either metal being in excess, the anode of that metal is wholly or partially raised from the solution until the required deposit is produced.

Production of Alloys.

GUETTIER, in his treatise on the manufacture of alloys, says:—"In general, it is advantageous to introduce into the alloys a certain number of elements, even in small proportions for many of them, and although several of these elements would not appear to possess an appreciable utility or have an important effect. The results of affinity obtained by the new elements favor the mixtures, increase the density and the homogeneousness, at the same time that they sometimes counterbalance, with great advantage, the tendency to liquation or separation in the melted mass. Thus, for instance, a statuary bronze, which could be made entirely of copper and tin, acquires new and indispensable qualities by the addition of zinc and lead, even in small proportions. As another example, the alloy of copper and zinc, which as such might be suitable for certain uses in the arts, becomes much more valuable for these same uses, and is improved and completed, by the addition of a small proportion of tin or lead.

"The more complex an alloy is to be, the more important is it that its preparation should be effected by the union of more simple alloys, previously made. Outside of the considerations which guide the founder as to the order in which the metal should be melted, such as the peculiar conditions of affinity, the similitude in the specific gravities, and the points of fusion, it is proper to examine the means and processes by which we add to the final melting those metals whose proportions in the alloy are comparatively small."

Mica in New Jersey.

PROF. GEORGE H. COOK, State Geologist of New Jersey, states that he has examined a mica mine near Broadway, in Warren County, N. J. The mica occurs in a vein which crosses the rock strata in a northwest and southeast direction. It is covered with earth to the depth of from eight to twelve feet, and has been uncovered in one place so as to show the full breadth of the vein to be from twelve to fourteen feet, and has been uncovered along the vein for twenty feet. A pit sunk twenty-five feet northwest of the large opening shows the continuance of the vein thus far, and there is every appearance of its being a continuous vein in the northwest and southeast directions, with a dip of about 60° to the southwest. The mica is in large and handsome plates, many from six to twelve inches across, some eighteen inches, and in one place the bottom was a plate of mica two feet wide. The whole vein appears to be composed of mica; and nearly all of a quality to work into plates for stoves.

NEW PUBLICATIONS.

NEW AND COMPLETE CLOCK AND WATCH MAKER'S MANUAL: Comprising descriptions of the various gearings, escapements, and compensations now in use in French, Swiss, and English clocks and watches, patents, tools, etc., with directions for cleaning and repairing. With numerous engravings. Compiled from the French, with an appendix containing a history of clock and watch making in America. By Mary L. Booth, translator of "The Marble Worker's Manual, etc." New York: John Wiley & Son, publishers, 2 Clinton Hall, Astor Place. 1872. Price $2 00.

This is a new edition of a work of real practical value to all interested in the delicate art to which it relates.

APPENDIX TO THE FIFTH EDITION of Dana's Mineralogy. By George J. Brush, Professor of Mineralogy in the Sheffield Scientific School of Yale College. New York: John Wiley & Son, 15 Astor Place. 1872.

This appendix is prepared with the co-operation of Prof. Dana, and is intended as one of a series to be published from time to time. It includes descriptions of eighty-seven minerals announced as new, and also a few important facts regarding a few old species published since the appearance of the original work in 1868.

APPLICATIONS FOR EXTENSIONS.

OPPONENTS of extensions must file *written* objections in the Patent Office at least 20 days before the day-of-hearing; and on that day, at noon, they must appear personally, or by proxy, at the Patent Office, and state the reasons of their opposition. All testimony—*pro* or *con*—must be taken and transmitted in accordance with the official rules, which will be furnished on application. The under-named patentees have recently petitioned for extensions (for seven years) of patents granted to them in the year 1858:—

THOMAS BERRY, Louisburg, Ky.—*Harvester.*—Patented June 22, 1858; and re-issued Jan. 16, 1872: testimony will close on May 21, next; last day for filing arguments and examiner's report, May 31; day-of-hearing, June 5.

EDWIN LEE BROWN, Chicago, Ill.—*Safety Vault-cover.*—Patented June 22, 1858; testimony will close on May 21, next; last day for filing arguments and examiner's report, May 31; day-of-hearing, June 5.

PHILOS B. TYLER, New Haven, Conn., WILLIAM JONES, Springfield, Mass., MARY J. LATHROP, Tolland, Conn., and CHARLES K. LADD, Springfield, Mass., administrators of BENJAMIN LATHROP, deceased.—*Riveting Machine.*—Patented June 22, 1858; testimony will close on May 21, next; last day for filing arguments and examiner's report, May 31; day-of-hearing, June 5.

FRANCIS BASCHNAGEL, Pueblo of Apizaco, Mexico.—*Restoring Waste Vulcanized Rubber.*—Patented June 22, 1858; testimony will close on May 21, next; last day for filing arguments and examiner's report, May 31; day-of-hearing, June 5.

SIDNEY C. CASE, Detroit, Mich.—*Railroad-car Seat and Berth.*—Patented June 22, 1858: testimony will close May 21, next; last day for filing arguments and examiner's report, May 31; day-of-hearing, June 5.

GIDEON BANTZ, Frederick, Md.—*Furnace for heating Steam-boilers, etc.*—Patented June 22, 1858; and re-issued Feb. 6, 1872; testimony will close on May 21, next; last day for filing arguments and examiner's report, May 31: day-of-hearing, June 5.

D. M. COOK, Mansfield, Ohio.—*Pan for evaporating Cane-juice.*—Patented June 22, 1858; and re-issued Dec. 20, 1859; testimony will close on May 21, next: last day for filing arguments and examiner's report, May 31; day-of-hearing, June 5.

IRA S. CADY, New York City.—*Plate for Burglar-proof Safe.*—Patented July 27, 1858; testimony will close on June 25, next; last day for filing arguments and examiner's report, July 5; day-of-hearing, July 10.

OFFICIAL LIST OF PATENTS

ISSUED FROM THE UNITED STATES PATENT OFFICE

For the Week ending March 26, 1872,

AND EACH BEARING THAT DATE.

[Reported officially for the "American Artisan."]

PATENT CLAIMS, DRAWINGS, AND SPECIFICATIONS.—*Owing to the constantly increasing number of patents issued, we have—as we must have done sooner or later—ceased to publish the Claims, and instead thereof we publish the names of the patentees, with the titles of their inventions, with descriptions on another page of some of the more important inventions; but we are prepared to furnish immediately on application, or by return mail, when requested by letter, a copy of the claims of any existing patent, for - 75 cents.*
We also furnish a printed copy of the whole specification of any patent issued since November 20, 1866, for - - $1 25
We will also supply a sketch of the parts claimed in any patent, or a full copy of the drawing thereof, at charges varying from $1 upwards.

ADVICE TO INVENTORS AND PATENTEES.

Whenever asked, we will promptly send, gratis, our recently published pamphlet, entitled "IMPORTANT INFORMATION FOR INVENTORS AND PATENTEES," *containing details of the proceedings necessary to be taken by inventors desirous of obtaining Letters-Patent in the United States. Also, Instructions to Patentees concerning Re-issues, Extensions, Infringements, Foreign Patents, etc.*

Address BROWN, COOMBS & Co., *Solicitors of American and Foreign Patents, 189 Broadway, New York.*

124,874.—KEY-HOLE GUARD FOR LOCKS.—James M. Alden, New Rochelle, N. Y.

124,875.—APPARATUS FOR EXTINGUISHING FIRES IN INFLAMMABLE LIQUIDS.—Homer Baker, Chicago, Ill., assignor to himself and Abner H. Angell, New York City.

124,876.—HAY-WAGON.—Aaron B. Barlow, Adrian, Mich.

124,877.—FOLDING-CRIB.—Arthur J. Bettridge, North Bridgewater, Mass.

124,878.—DERRICK.—Hannibal S. Blood, New Orleans, La.

124,879.—FLANGING MACHINE.—George A. Bowers, assignor to Frank Sturges & Co., Chicago, Ill.

124,880.—MACHINE FOR CUTTING VENEERS.—Jonathan C. Brown, Nyack, N. Y.

124,881.—PAPER-MAKING MACHINE.—John Burns and John Campbell, Bloomfield, N. J.

124,882.—BRAIDING MACHINE.—James D. Butler, assignor to Butler Braider Company, Lancaster, Mass. Ante-dated March 8, 1872.

124,883.—CHURN.—Andrew J. Cox, Indianapolis, Ind.

124,884.—CHILDREN'S CRIB.—David Cox, Cincinnati, Ohio.

124,885.—LIFTING MACHINE.—Thomas S. Crane, assignor to himself, Charles M. Bolen, and Fred. K. Day, Newark, N. J.

124,886.—MATCH-BOX.—Theodore Crommelin, Brooklyn, N. Y.

124,887.—ATTACHMENT TO CARPENTER'S SQUARES.—John Dalgliesh, Charlestown, Mass.

124,888.—HOLDBACK.—George F. De Vine, Hamilton, Canada.

124,889.—WHIP-SOCKET.—George F. De Vine, Hamilton, Canada.

124,890.—APPARATUS FOR SEPARATING TIN FROM SCRAP.—Frederick William Dorn, New York City. Ante-dated March 8, 1872.

124,891.—CHILD'S CORSET.—Harriet G. Emery and Margaret C. Fuller, assignors to H. Godfrey Emery, Boston, Mass.

124,892.—SODA-WATER DRAUGHT-TUBE.—David Fergus, Philadelphia, Pa.

124,893.—WASHING MACHINE.—Curtis Gates, Littleton, N. H.

124,894.—RUFFLING ATTACHMENT FOR SEWING-MACHINES.—William L. Gray and Orlando T. Joy, assignors to Davis Sewing-machine Company, Watertown, N. Y.

124,895.—STEAM WATER-EJECTOR.—John Habermeal and Henry Kleiman, Allegheny, Pa.

124,896.—SHAWL AND BREAST-PIN.—William H. Hoctensmith and Charles Coester, Jun., Bridgeport, Conn. Ante-dated March 8, 1872.

124,897.—FLEXIBLE GAS-TUBE SUPPORT.—Albert Hunsinger, Chicago, Ill.

124,898.—STEAM-GENERATOR.—Henry Howard, Springfield, Mass.

124,899.—BACK-LOG BOILER FOR RANGES AND OTHER COOKING APPARATUS.—Benjamin Hunter, Philadelphia, Pa.

124,900.—APPARATUS FOR OPERATING CHURNS.—Daniel W. Ketcham, Owasso, Mich. Ante-dated March 19, 1872.

124,901.—DEODORIZING AND FERTILIZING COMPOUND.—Joseph M. Loewenstein, New Orleans, La.

124,902.—END-GATE FOR WAGONS.—George Lounsbery, Chenoa, Ill.

124,903.—FLOCK-GRINDER.—Edwin T. Marble, Worcester, Mass.

124,904.—Canceled.

124,905.—PHOTO-ENGRAVING ON METALS.—William Alphonso McGill and Robert Granville Pine, Memphis, Tenn. Ante-dated March 19, 1872.

124,906.—SAW GAUGE.—Warren P. Miller, New York City.

124,907.—PRINTING-PRESS.—Thomas N. Morse, Fairhaven, Mass.

124,908.—HEAD-BLOCK FOR SHOEMAKERS.—John H. Morton, Deering, assignor to James Webb, Jun., Portland, Me.

124,909.—VALVE-BUCKET.—Amos A. Moulton, Providence, R. I.

124,910.—MEDICAL COMPOUND OR LINIMENT.—Philander Rowley Myres, Oxford, Ohio.

124,911.—APPARATUS FOR MANUFACTURING TIN-LINED LEAD PIPES.—Edwin W. Newton, Franklin Grove, Ill.

124,912.—LOCK FOR PIANOS, ETC.—Titus Powers, assignor to himself and Lewis Crooke, New York City. Ante-dated March 18, 1872.

124,913.—SHOULDER-BRACE AND SUSPENDER COMBINED.—Fred. C. Pratt and George W. Whitney, assignors to said Whitney, Cleveland, Ohio.

124,914.—WATER-PROOF HOSE.—Thomas L. Reed, Providence, R. I.

124,915.—GAME.—J. Morrill Rix, Warner, N. H.

124,916.—STRETCHING BOARD FOR LEGS OF PANTALOONS.—Elliot F. Smith, Salem, Mass.

124,917.—MACHINE FOR CUTTING BARREL-HEADS.—John B. Stanhope, Philadelphia, Pa.

124,918.—FANNING MILL.—Henry K. Stoner, West Lampeter, Pa.

124,919.—MILK-PAIL REST.—George C. Taft, Worcester, Mass.

124,920.—SHIRT COLLAR.—Varnum N. Taylor, Springfield, Mass.

124,921.—AUTOMATIC BOILER-FEEDER.—Daniel Vaughan, assignor to himself, Augustine L. Helm, and John B. Mahoney, Cincinnati, Ohio. Ante-dated March 6, 1872.

124,922.—CULTIVATOR.—Charles Warner, Monroe, Ohio.

124,923.—METHOD OF DETACHING BOATS.—Louis H. Watson, Pittsburg, Pa.

124,924.—MUSIC-LEAF TURNER.—William Weaver, Phœnixville, Pa.

124,925.—PERFORATING EDGED COLUMN RULES.—John C. White, Quincy, Ill.

124,926.—CORN-PLANTER.—Albert Windeck, Peoria, Ill.

124,927.—SPRING BED-BOTTOMS AND SOFAS.—William D. Adams, assignor of two-thirds of his right to Charles Rich, Poughkeepsie, N. Y.

124,928.—PAINT-GUARD AND BRUSH-HOLDER.—Walter T. Bailey, Fairfax County, Va.

124,929.—WATER-TUBE STEAM-BOILER.—Calvin G. Beltel, Easton, assignor to William H. Cornell, Titusville, Pa. Ante-dated March 14, 1872.

124,930.—MACHINE FOR SOLDERING CAN-CAPS.—William B. Bishop, Brooklyn, N. Y.

124,931.—DAMPER REGULATOR FOR STOVES.—Lewis Boore, assignor to himself and William Boore, Buffalo, N. Y.

124,932.—TOOL FOR ENLARGING OIL-WELLS.—Chester Bullock, Meadville, Pa.

124,933.—PICTURE-NAIL.—Spencer C. Cary, Brooklyn, N. Y.

124,934.—TRAVELING-BAG CLASP.—Robert W. Chapman, Newark, N. J.

124,935.—UMBRELLA.—George F. Child, Columbus, Ohio.

124,936.—ROSE FOR DOOR-KNOBS.—Edwin A. Craw, Waterbury, Conn.

124,937.—METHOD OF SECURING TIRES TO CARRIAGE-WHEELS.—Phineas D. Crosby, Danbury, Conn.

124,938.—MACHINE FOR MAKING PANS.—John Dane, Jun., Newark, N. J.

124,939.—GUN-LOCK.—Joseph C. Dane, La Crosse, Wis., assignor to Charles Parker, Meriden, Conn.

124,940.—COMBINED SPLICE AND SAFETY-HOOK FOR LADDERS.—Joseph Edmunds, South Adams, Mass.

124,941.—BRAKE-LOCK FOR WAGONS.—Lawrance Egeberg and Henry Egeberg, Columbus City, Iowa.

124,942.—CLOTHES-WRINGER.—Robert E. Ferguson, Chicago, Ill.

124,943.—TOBACCO-HANGER.—Alban G. Ferriss, New Milford, Conn.

124,944.—DRIER.—Elisha Foote, East Bloomfield, N. Y., and Marshall P. Smith, Baltimore, Md.

124,945.—COTTON-SEED HEATER.—William M. Force, Newark, N. J.

124,946.—STEAM-ENGINE LUBRICATOR.—Jacob Foster, Philadelphia, Pa.

124,947.—EXTENSION-TABLE SLIDE.—Samuel R. Garner, Independence, Iowa.

124,948.—DRESS GOODS HOLDER.—Albert S. Grant, Rochester, Minn.

124,949.—SASH-HOLDER.—Alonzo Griffin and Leander L. Griffin, Scranton City, Pa. Ante-dated March 9, 1872.

124,950.—KNITTING MACHINE.—Hugo Guenther, New York City.

124,951.—FLY-TRAP.—Lydia M. Gould, Chicago, Ill. Ante-dated March 14, 1872.

124,952.—ELEVATOR.—Melancthon Hanford, Boston, Mass.

124,953.—APPARATUS FOR MOUNTING AND EXHIBITING PICTURES, ETC.—Jason W. Hardie, New York City. Ante-dated March 11, 1872.

124,954.—LUBRICATING DEVICE.—Charles Hirsch, Buffalo, N. Y.

124,955.—CLOTHES-PIN.—Robert W. Huston, Washington, D. C.

124,956.—SCROLL-SAWING MACHINE.—Samuel Ide, Medina, N. Y.

124,957.—REFRIGERATOR.—Edgar B. Jewett, Buffalo, N. Y.

124,958.—SASH HOLDER.—George H. Johnson and Frederik Bottner, Bridgeport, Conn.

124,959.—CONICAL STOP-COCK.—J. Evans Jones, Tidioute, Pa.

124,960.—REVERSIBLE LATCH.—Albert D. Judd, New Haven, Conn.

124,961.—PAPER-FILE.—Lawson P. Keech, Washington, D. C., assignor to John B. Smith, New York City, and Ellen P. Keech, Washington, D. C.

124,962.—BEE-HIVE.—Homer A. King, New York City.

124,963.—METALLIC ROOFING.—Charles Lewando, Cambridge, assignor to F. H. Rice, Watertown, Mass.

124,964.—MANUFACTURE OF POTASH AND PHOSPHATE OF LIME.—Morris B. Manwaring, New York City, and R. De Witt Birch, Philadelphia, Pa.

124,965.—COMPOSITION FOR COLORING LEATHER.—Lewis C. May, Cochituate, Mass.

124,966.—FURNACE-GRATE BAR.—William Mellor, Paterson, N. J.

124,967.—LOOM-SHUTTLE.—Felix Miller, assignor to Morris Cohn, New York City.

124,968.—INSTRUMENT FOR FOLDING CLOTH.—Herman Moschcowitz, New York City.

124,969.—STARCHING MACHINE.—Patrick O'Thayne, assignor of one-fourth his right to Calvin Willard, New York City.

124,970.—DEVICE FOR FORMING LETTERS ON THE CIRCUMFERENCE OF METAL DISKS.—Stephen M. Ott, Newark, N. J.

124,971.—MACHINE FOR ROLLING STOCK FOR FINGER RINGS.—John S. Palmer, Providence, R. I.

124,972.—ICE AND WATER URN.—Edmund A. Parker, West Meriden, Conn.

124,973.—RAILROAD-CAR HEATER.—Charles F. Pike, Providence, R. I.

124,974.—SIGNAL FOR RAILWAY CROSSINGS.—Charles F. Pike, Providence, R. I.

124,975.—SHEARS.—Robert Renz, Naugatuck, Conn.

124,976.—ANIMAL-TRAP.—John Rollins, Kingston, Tenn.

124,977.—RAILWAY-RAIL.—Rufus S. Sanborn, Rockford, Ill.

124,978.—COTTON-PICKER.—Nils F. Sandelin, assignor to himself, Edward O. Jenkins, New York City, and John Paulson, Vasa, Minn.

124,979.—TOBACCO MACHINE.—Joab Scales, Toronto, Canada.

124,980.—RECIPROCATING STEAM-ENGINE.—John Shepherd and Carlos A. Clark, Bloomfield, Iowa.

124,981.—CUPBOARD-LATCH.—William E. Sparks and Purmort Bradford, assignor to Sargent & Co., New Haven, Conn.

124,982.—APPARATUS FOR DRYING AND CURING ANIMAL AND VEGETABLE SUBSTANCES.—Michael J. Stein, New York City.

124,983.—PROCESS AND APPARATUS FOR RENDERING FATS, ETC.—Michael J. Stein, New York City.

124,984.—BLACKING AND BRUSH HOLDER.—Ephraim H. Sweetser, Salem, Mass.

124,985.—BRAKE FOR RAILWAY-CARS.—Anton Tatzel, Sen., and Friedrich Kinn, New York City.

124,986.—RIGGING FOR VESSELS.—George Taylor, Harwich, Mass.

124,987.—PRESERVING SWEET POTATOES.—Joseph C. Tilton, Pittsburg, Pa.

124,988.—METHOD OF DOUBLE-STRETCHING STRANDS OF BAND-ING-CORD.—Thomas Unsworth, Manchester, England.

124,989.—STOP-MOTION FOR WINDING-FRAMES.—Thomas Unsworth and Edward Whalley, Manchester, England.

124,990.—SOFA-BEDSTEAD.—William Walcutt, New York City. Ante-dated March 19, 1872.

124,991.—CATTLE CARD.—William M. Warren, Watertown, Conn.

124,992.—ICE-CREAM FREEZER.—Theophilus Weaver, Harrisburg, Pa.

124,993.—APPARATUS FOR VAPORIZING AND BURNING HYDROCARBON.—Samuel J. Whiting, Philadelphia, Pa.

124,994.—BREECH-LOADING FIREARM.—Eli Whitney, New Haven, Conn.

124,995.—LOOM-PICKING MECHANISM.—Henry A. Whitten, New Bedford, assignor to himself, J. S. Davis, and George S. Bassett, Holyoke, Mass.

124,996.—METALLIC LAYER-LOOP FOR HARNESS.—Richard J. Algeo, Kalamazoo, Mich.

124,997.—MANUFACTURE OF BOXES.—Alpheus N. Allen, Chicago, Ill., assignor to the Swift and Courtney and Beecher Company, New Haven, Conn.

124,998.—DRYING-HOUSE.—Josiah J. Allen, Philadelphia, Pa.

124,999.—STAY-BRACE FOR TRUNK-LIDS.—Solomon H. Amidon, Miller's Falls, Mass.

125,000.—DRIVEN-WELL TUBE.—William D. Andrews, Brookhaven, N. Y.

125,001.—WOOD PAVEMENT.—William W. Ballard, Elmira, N. Y.

125,002.—MEANS OF ATTACHING BOWLS, LAMPS, ETC., TO THEIR STANDS.—Samuel S. Barrie, New York City.

125,003.—EPERGNES FOR FRUITS AND FLOWERS.—Samuel S. Barrie, New York City.

125,004.—FRUIT AND VEGETABLE PARER.—Asahel G. Batchelder, Lowell, Mass.

125,005.—CIGAR-MOLD.—John Baxter, assignor to himself and Thomas Adams, Detroit, Mich.

125,006.—ELECTRIC BELT FOR THE BODY.—Jacques Edmund Bazault, Paris, France.

125,007.—METALLIC FASTENER FOR LEATHER.—Horace Beals, East Stoughton, Mass.

125,008.—PUMP.—John Bean, Hudson, Mich.

125,009.—COMPOUND FOR HARDENING BAR-IRON.—Franklin E. Blake, Mattoon, Ill.

125,010.—WHISK-BRUSH.—Hiram S. Blunt, New York City.

125,011.—HARNESS-SADDLE.—Valentine Borst, New York City.

125,012.—BRICK MACHINE.—George C. Bovey, assignor to Geo. Weber, Cincinnati, Ohio; said Weber assignor to himself and William M. Corry.

125,013.—BRICK-DRYING HOUSE.—George C. Bovey, assignor to George Weber, Cincinnati, Ohio; said Weber assignor to himself and William M. Corry.

125,014.—GRAIN SEPARATOR AND BAGGER.—John J. Bradner, Pine Creek, N. Y.

125,015.—SLAUGHTERING APPARATUS.—Moses Brenner, Baltimore, Md.

125,016.—LUBRICATING TALC FOR MACHINERY.—Albert Bridges, Jersey City, N. J.

125,017.—PREPARING FERTILIZING MATERIALS FROM EARTH, ETC.—Samuel Brown, New Oxford, Pa.

125,018.—COMBINED PLANTER AND CULTIVATOR.—James N. Burton, Griffin, Ga.

125,019.—WOOD PAVEMENT.—Luther Caldwell, Elmira, N. Y.

125,020.—TANNING HIDES.—Joel Carter and Alanson C. Keith, assignors to themselves, James L. Baldwin, and Levi Dederick, Jersey City, N. J.

125,021.—CORN-CRIB.—Commodore B. Clark, Pleasant Grove, Iowa.

125,022.—LUBRICATOR FOR STEAM-ENGINES.—William A. Clark, New Haven, Conn.

125,023.—SAND-DREDGING MACHINE.—John Thorne Clarkson, Chicago, Ill.

125,024.—WRITING APPARATUS FOR THE BLIND.—James R. Cole, Paducah, Ky.

125,025.—ROAD-SCRAPER.—Elihu E. Coy, Longview, Tex.

125,026.—PILE FABRIC.—George Crompton, Worcester, Mass.

125,027.—GRAIN-SEPARATOR.—Garland A. Dabney, San José, Cal.

125,028.—BOX.—Robert B. Davis, New York City.

125,029.—CALL-BELL.—Henry A. Dierkes, New York City.

125,030.—SOLAR-CAMERA.—Joseph H. Dille and Elisha W. Poston, assignors, by mesne-assignments, to John A. Shoaff, Fort Wayne, Ind.

125,031.—HAY, STRAW, AND OTHER BALES.—Levi Dodge, Waterford, N. Y.

125,032.—RUFFLING ATTACHMENT FOR SEWING-MACHINES.—George E. Dolton, Monee, Ill.

125,033.—HEMMER FOR SEWING-MACHINES.—George E. Dolton, Monee, Ill.

125,034.—EXTENSION-SLIDE.—Jacob Dourson, Columbus, Ohio.

125,035.—WASHING MACHINE.—Joseph B. Epstein and John J. Braker, Philadelphia, Pa.

125,036.—CENTRIFUGAL MACHINE FOR DRAINING SUGAR, ETC.—Albert Fesca, Berlin, Prussia.

125,037.—AIR-PUMP.—William H. Flanigan, Philadelphia, Pa.

125,038.—LINE-CLAMP.—William A. Ford, Greensburgh, Ind.

125,039.—ELECTRO-MAGNETIC APPARATUS FOR STEERING TORPEDO-BOATS, ETC.—John G. Foster, Nashua, N. H.

125,040.—STOVE-GRATE FOR ADMITTING AIR TO SIDES AND BODY OF THE FUEL.—Benjamin Franklin, Indianapolis, Ind.

125,041.—SHEARS.—Joseph Gardner, Louisville, Ky.

125,042.—GAS-BURNER.—Smith Gardner, New York City.

125,043.—APPARATUS FOR THE MANUFACTURE OF COAL-GAS.—Alonzo M. Giles, Boston, Mass.

125,044.—Casting Copper Tubes.—James F. Guthrie, South Bridgewater, Mass.

125,045.—Machine for punching Horseshoe Nail-blanks from Plate-metal.—George L. Hall, assignor to Globe Nail Company, Boston, Mass.

125,046.—Car-axle.—John W. Hard, Decorah, Iowa.

125,047.—Boot and Shoe.—Thomas T. Hartford, Boston, Mass.

125,048.—Process of burning Pottery Ware, etc.—George C. Hicks, Baltimore, Md. Ante-dated March 12, 1872.

125,049.—Car brake and Starter.—Charles M. Hinckley, Boston, Mass.

125,050.—Knife-cleaner and Sharpener.—Sophus A. W. Houmann and Hans Nielson, St. Louis, Mo.

125,051.—Bucket for Chain Pumps.—William Hutchison, Belleville, Mich.

125,052.—Apparatus for checking Horses.—Samuel S. Ingalls, Chicago, Ill. Ante-dated March 19, 1872.

125,053.—Carriage-wheel.—Moses Johnson, Three Rivers, Mich.

125,054.—Washing Machine.—John Key, Union City, assignor to himself and William J. Fields, Saratoga, Ind.

125,055.—Machine for straightening Railway Rails.—George I. Kinzel, Knoxville, Tenn.

125,056.—Utilizing the Exhaust Steam of Steam-engines.—Ernst Körting, Berlin, Prussia.

125,057.—Cultivator and Potato-digger.—Joseph G. Lacy, Eureka, Wis. Ante-dated March 13, 1872.

125,058.—Lamp.—Edward L. Lambie, assignor of one-half his right to O. T. Thompson, Washington, D. C.

125,059.—Tassel.—Henry C. Lees, Philadelphia, Pa.

125,060.—Trace-buckle.—John Lindsey, Litchfield, Ill.

125,061.—Vegetable-cutter.—Jerome S. Mace, Au Sable, N. Y. Ante-dated March 15, 1872.

125,062.—Apparatus for extracting Marrow from Hams.—William N. Macqueen, St. Louis, Mo.

125,063.—Fire-extinguisher.—Thomas J. Martin, Dowagiac, Mich.

125,064.—Hoisting Apparatus.—Nathaniel S. McFarland, Brooklyn, N. Y.

125,065.—Lifting-jack.—Shannon McGuffin, Rising Sun, Ind.

125,066.—Hair Restorative.—Sally Maria McNett, Topeka, Kan., assignor of one-half of her right to Thomas F. Parrish, Washington, D. C., and J. A. Johnston, Topeka, Kan.

125,067.—Manufacture of Illuminating Oils.—Charles C. Mengel, Brooklyn, N. Y., and Alois P. Von Pöhrnhoff, St. Catherine's, Canada. Ante-dated March 16, 1872.

125,068.—Steam-generator.—Truman Merriam, assignor to himself and J. B. Smith, Milwaukee, Wis. Ante-dated March 19, 1872.

125,069.—Cartridge-box.—John Miller, United States Army.

125,070.—Apparatus for stamping and feeding out Paper.—John O. Montignani and John Gibson, Jun., Albany, N. Y. Ante-dated March 20, 1782.

125,071.—Fence.—Levi Moore, Baraboo, Wis.

125,072.—Dough-mixer.—Augustus E. Muth, Cincinnati, Ohio.

125,073.—Multiple-time Dial for Clocks.—John Frederick Niehaus, St. Louis, Mo.

125,074.—Treating Sewage for Fertilizers, etc.—Henry Headley Parish, Rome, Italy.

125,075.—Brick Machine.—Henry D. Phillips, Jun., Trenton, N. J., and Carmi H. Williams, Matteawan, N. Y., assignors to said Henry D. Phillips, Jun.

125,076.—Auger.—Hiram Pitcher, assignor to himself and H. and G. O. Trowbridge, Fond du Lac, Wis.

125,077.—Compound for Writing-fluid.—Isidor Popper, Phillipsburg, N. J.

125,078.—Electro-magnetic Apparatus.—James W. Powell, New York City.

125,079.—Manufacture of Sheet-iron.—Daniel L. Pratt, Bethesda, Ohio.

125,080.—Furnace Dead-plate.—Alonzo C. Rand, Aurora, Ill.

125,081.—Safety-valve.—Theodore D. Rand, Philadelphia, Pa.

125,082.—Sled.—John K. Reichert, Lancaster, Ohio.

124,083.—Mold for Glassware.—Jacob H. Reighard, Wheeling, W. Va.

125,084.—Governor for Steam-engines.—Edwin Reynolds and Nathaniel G. Herreshoff, Providence, R. I.

125,085.—Apparatus for carburetting Air.—George Reznor, Mercer, Pa.

125,086.—Valve-cock.—Philip C. Rowe, Boston, Mass.

125,087.—Cotton-cultivator.—Nils F. Sandelin, Mott Haven, N. Y., assignor to himself, Edward O. Jenkins, New York City, and John Paulson, Vasa, Minn.

125,088.—Portable Fare-box.—John C. Schooley, New York City.

125,089.—Drawing-board.—Ludwig F. Schwenkel, New York City.

125,090.—Lamp-chimney.—William Sedgwick, Poughkeepsie, N. Y.

125,091.—Sonnette.—George W. Sherman, Brooklyn, N. Y.

125,092.—Valve for Water-closets.—William Smith, San Francisco, Cal.

125,093.—Cultivator.—Jacob W. Spangler, York, Pa.

125,094.—Potato-digger.—William Starkey, assignor to himself and Robert M. Bateman, Cedarville, N. J.

125,095.—Metallic Hub for Vehicle-wheels.—Sylvester T. F. Sterick, Georgetown, D. C.

125,096.—Buoy-light.—Levi Stevens, Washington, D. C.

125,097.—Stock-car.—Zadok Street, Salem, Ohio.

125,098.—Lumber-drier.—Eli J. Sumner, Chicago, Ill.

125,099.—Washing Machine.—Jeremy Taylor, Three Rivers, Mich.

125,100.—Sad-iron.—Jonathan H. Vail, New Brunswick, N. J.

125,101.—Harness Pads.—John H. Van Riper, Chelsea, Mich.

125,102.—Preserving Meat, Poultry, Fish, etc.—Angel Vezquez and Just Edmund Rosenberg, Santiago, Chili.

125,103.—Treadle for Sewing-machines.—Ausbert H. Wagner, Chicago, Ill.

125,104.—Washing Machine.—John M. Walker, Plattsburg, Mo.

125,105.—Valve for Steam-engines.—John Watson, Toledo, Ohio.

125,106.—Automatic Steam-boiler Feeder.—Jerome Wheelock, Worcester, Mass.

125,107.—Manufacture of Steel.—George F. Wilson, Providence, R. I.

125,108.—Washing Machine.—George L. Witsil, Beverly, N. J., assignor to himself, Jared R. Cook, West Meriden, and Harvey Ford, New Haven, Conn.

125,109.—Rotary Show-case.—Thomas E. Wood, Chicago, Ill.

125,110.—Combined Stool and Chair.—Emil Worch, New York City.

125,111.—Apparatus for rendering and drying Animal Matters.—Michael J. Stein, New York City.

125,112.—Rendering Animal Matter and drying and pulverizing the same.—Michael J. Stein, New York City.

RE-ISSUES.

4,822.—Wood Pavement.—William W. Ballard, assignor of part interest to Tallmadge E. Brown and Edward L. Marsh, Elmira, N. Y. Patent No. 105,292, dated July 12, 1870.

4,823.—Handle for Children's Carriages.—Roscoe G. Elder, New York City. Patent No. 99,420, dated Feb. 1, 1870.

4,824.—Harvester.—(Div. A.)—Samuel Ray and Moses R. Shalters, Alliance, assignors to John F. Seiberling, Akron, Ohio. Patent No. 23,707, dated April 19, 1859; re-issue No. 2,230, dated April 17, 1866.

4,825.—Harvester.—(Div. B.)—Samuel Ray and Moses R. Shalters, Alliance, assignors to John F. Sieberling, Akron, Ohio. Patent No. 23,707, dated April 19, 1859; re-issue No. 2,230, dated April 17, 1866.

4,826.—Harvester.—(Div. C.)—Samuel Ray and Moses R. Shalters, Alliance, assignors to John F. Sieberling, Akron, Ohio. Patent No. 23,707, dated April 19, 1859; re-issue No. 2,230, dated April 17, 1866.

4,827.—Machine for separating Middlings.—William R. Middleton, Cleveland, Ohio. Patent No. 108,926, dated Nov. 1, 1870.

4,828.—Shoe-last.—William J. B. Mills, assignor to De Witt C. Taylor, trustee, Philadelphia, Pa. Patent No. 123,116, dated Jan. 30, 1872; ante-dated Jan. 14, 1872.

4,829.—Tempering Apparatus.—Henry H. Ray, Arena, Wis. Patent No. 119,406, dated Sept. 26, 1871; ante-dated Sept. 23, 1871.

4,830.—Attaching Carriage-wheels to their Axles.—Wilson Elder, assignor to Samuel G. Morrison, Mill Hall, Pa. Patent No. 110,557, dated Dec. 27, 1870.

4,831.—Skirt-supporting Corset.—Lavinia H. Foy, assignor, by mesne-assignments, to herself and James H. Foy, New Haven, Conn. Patent No. 39,911, dated Sept. 15, 1863; re-issue No. 2,653, dated June 18, 1867.

4,832.—Transplanter.—John C. Fuller, Hinmansville, N. Y. Patent No. 87,037, dated Feb. 16, 1869.

4,833.—Steam-generator.—Henry M. Rulon and Jesse F. Rulon, assignors to themselves and William Clark, Monmouth, Ill. Patent No. 117,569, dated Aug. 1, 1871.

4,834.—Drying Fruits, Vegetables, etc.—Francis H. Smith, assignor, by mesne-assignments, to Marshall P. Smith, Baltimore, Md. Patent No. 31,566, dated Feb. 26, 1861; re-issue No. 3,017, dated June 30, 1868; re-issue No. 4,468, dated July 7, 1871.

4,835.—Snow-shovel.—William P. Wentworth, assignor of one-half interest to Maynard Miller, Seneca Falls, N. Y. Patent No. 107,314, dated Sept. 13, 1870.

4,836.—Device for tightening Carriage-tires.—Jonathan Burns West, Geneseo, N. Y. Patent No. 101,330, dated March 29, 1870.

4,837.—Preserving Wood for Railroad Ties, etc.—(Div. A.)—Archibald B. Tripler, assignor to Charles E. Tripler, Philadelphia, Pa. Patent No. 104,917, dated June 28, 1870.

4,838.—Railroad-tie.—(Div. B.)—Archibald B. Tripler, assignor to Charles E. Tripler, Philadelphia, Pa. Patent No. 104,917, dated June 28, 1870.

DESIGNS.

5,705 and 5,706.—Carpet-pattern.—Montagu Blatchford, Halifax, England, assignor to Joseph Wild & Co., New York City.

5,707 to 5,719.—Carpet-pattern.—Albert Cowell, Kidderminster, England.

5,720.—Carpet-pattern.—James C. Johnston, Scarborough N. Y.

5,721 to 5,723.—Carpet-pattern.—Hugh S. Kerr, assignor to Dornan, Maybin & Co., Philadelphia, Pa.

5,724.—Oil-cloth Pattern.—Jeremiah Meyer, assignor to Deborah Powers, Albert E. Powers, and Nathaniel B. Powers, Lansingburgh, N. Y.

5,725 to 5,727.—Oil-cloth Pattern.—James H. Park, Burlington, N. J., and Byerly Hart, Philadelphia, Pa.

5,728.—Type-cases.—Albon H. Bailey, Somerville, Mass.

5,729.—Type.—Carl E. Heyer, West Roxbury, Mass.

5,730.—Clock-fronts.—Nicholas Müller, New York City.

5,731.—Bird-cage.—George R. Osborn and Benjamin A. Drayton, New York City.

5,732 and 5,733.—Chandelier.—Frederick R. Seidensticker, assignor to Bradley & Hubbard, West Meriden, Conn.

TRADE-MARKS.

712.—Gin.—Adams, Blake & Taylor, Boston, Mass.

713.—Ticking and Cotton Fabrics.—Amoskeag Manufacturing Company, Manchester, N. H.

714.—Lead for Painter's Use.—Boston Lead Company, Boston, Mass.

715.—Essence of Jamaica Ginger.—Frederick Brown, Philadelphia, Pa.

716.—Cotton, Woolen, and other Fabrics.—Hamilton Woolen Company, Southbridge, Mass.

717 and 718.—Hair-nets.—Abraham C. Jennings, New York City.

719.—Shirting, etc.—Langdon Manufacturing Company, Manchester, N. H.

720.—Tea.—Edmund Pavenstedt & Co., New York City.

721.—Material for Felt Roofings.—The New England Felt-roofing Company, Boston, Mass.

EXTENSIONS.

19,638.—Combined Floating Anchor and Life-preserver.—Joseph Humphries, Washington, D. C. March 16, 1858.

19,654.—Machine for trimming Books.—Mary H. Semple (administratrix of the estate of A. C. Semple, deceased), Lowell, Mass. March 16, 1858.

19,767.—Machine for testing and measuring the Strength of Car-springs.—Perry G. Gardiner, New York City. March 30, 1858.

19,626.—Photo-lithography.—Asa O. Butman (administrator of the estate of James A. Cutting, deceased), and L. H. Bradford, Boston, Mass. March 16, 1858; re-issue No. 1,019, dated July 31, 1860.

19,619.—Machine for planing Blind-slats.—Charles Carlisle, Woodstock, and Leonard Worcester, Brattleborough, Vt. March 16, 1858.

19,644.—Sawing Machine.—Harriet L. Low (administratrix of the estate of Henry H. Low, deceased), Galena, Ill. March 16, 1858.

19,770.—Constructing Dolls' Heads.—Ludwig Greiner, Philadelphia, Pa. March 30, 1858.

Letter Box

R. H., of Va.—We cannot recall the item you mention. It is doubtful if iron rings could be butt-welded so as to derive much strength compared with lap-welding, and you will doubtless find it much cheaper and easier to lap-weld your bit-rings than to devise or construct mechanism for butt-welding.

F. A. B., of Mass.—After considerable inquiry, we are unable to find that metallic chromium or tungsten can be purchased as an article of trade in New York City. You will doubtless have to employ some chemist to reduce it for you from the ore, which will be quite costly.

J. P., of N. J.—An atmosphere of carbonic oxyd would not, under ordinary conditions, absorb oxygen from sulphides to form carbonic acid. Neither will carbonic oxyd, in like cases, convert sulphates to sulphides. It is possible that by peculiar processes a skilful chemist might bring about different results, but probably no practical use would be derived therefrom.

G. G., of Mo.—A very hard drying putty is made by mixing white-lead and Japan varnish, and beating in a mortar to the required consistency.

L. S., of Ind.—A cheap varnish for harness, etc., may be made by heating two parts of common rosin and one of india-rubber in a suitable vessel until they are melted together, and then thinning with boiled linseed-oil, stirring until cold. A cheaper harness varnish may be made by dissolving rubber in alcohol, and adding lampblack to give the desired black color.

M. O., of S. C.—You will find difficulty in grinding desiccated sweet potatoes in a burr-stone mill. A mill with sharp cutting plates to comminute the material will be better. We believe your design for improved package for the flour to be wholly original and new, and therefore patentable. We send you by mail our pamphlet of advice to inventors, and specimen numbers of our Journal as desired.

D. L., of Maine.—Your apparatus for rolling logs from the logway to the carriage in a saw-mill seems to us perfectly practicable in principle, but we think you can simplify it somewhat in construction. In other respects, we think it much superior to the other mechanism you mention.

R. S. T., of Pa.—You cannot obtain a patent on a new variety of fruit or vegetable. If you will send us a more carefully prepared sketch, showing the manner in which the seed-dropper of your onion-planter is operated, we can give a more reliable opinion as to its patentability. The claim would have to be on the combination of parts, as the slide itself is not new for similar purposes, and we must know what and how arranged are the adjuncts of this device in order to comprehend the gist of the improvement. We have not much confidence in the utility of the pasture weed with which you are experimenting for paper-stock; but, if you will send us an account of your processes and success, whether good or bad, we will cheerfully publish it.

ENGLISH PATENT JOURNAL.

[This list is condensed weekly from the "Journal of the British Commissioners of Patents," expressly for the "American Artisan."]

524.—Time-signaling apparatus for railways.—L. W. Coe, Auburn, N. Y.—Feb. 17, 1872.

545.—Lithographic printing machinery.—R. M. Hoe, New York City.—Feb. 20, 1872.

585.—Railway rails or bars.—T. R. Tinley, Tarrytown, N. Y.—Feb. 23, 1872.

590.—Machine for sewing boots and shoes.—N. A. Baldwin, Milford, Conn.—Feb. 23, 1872.

595.—Pneumatic brake, etc.—G. Westinghouse, Jun., Pittsburg, Pa.—Feb. 24, 1872.

608.—Knitting machine.—D. Bickford, New York City.—Feb. 26, 1872.

609.—Machine for finishing horseshoe-nails.—J. A. Wills, Vergennes, and L. S. Kingsland, Burlington, Vt.—Feb. 26, 1872.

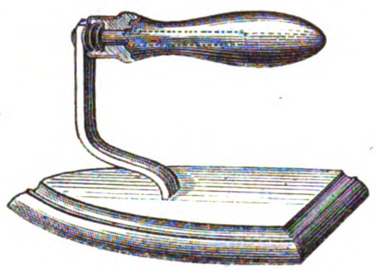
612.—Improved lever.—W. H. Chase, New York City.—Feb. 28, 1872.

620.—Cast-metal wheels, etc.—A. Washburn, Mass.—Feb. 28, 1871.

TAIT'S PATENT SAD-IRON.

A HOT sad-iron with a cool handle is certainly a device to be appreciated by all whose duty it is to smooth fabrics after the old-time fashion of the laundry, and there seems no more plausible way of securing such an appliance than to make the iron with a handle that may be removed while the iron itself is being heated for use. Acting on this idea, Mr. Alexander Tait, of Sonoma, Tuolumne County, Cal., has patented (Oct. 17, 1871) the simple combination of parts represented in the accompanying cut.

The lower or smoothing portion of the iron is of the ordinary form, and is furnished with an upright standard, preferably of wrought-iron, and fixed in place during the operation of casting the smoothing part just mentioned. This standard is in proper position near the front or point end, and has at its upper end and at right angles to it, in other words, horizontally, a rod, which extends back toward the rear of the iron in the same position that the handle of an ordinary sad-iron occupies. At the end of the rod next to the standard is an enlargement or short screw, which may be



either formed upon or firmly fixed to the rod, or it may be formed upon or fixed to the upper end of the standard. The handle may be made of wood or of any other non-conducting substance or material, and is made of the proper form to fit the grasping hand. In the end of and passing through the handle is a longitudinal socket, deep enough to admit the rod. A ferrule passes over the end of the handle, the interior of which is tapped with a screw-thread to fit the screw, so that, by simply inserting the rod in the socket and giving the handle a few turns so as to screw the ferrule upon the screw, the attachment is firmly and effectively made. The rod serves to strengthen the attachment, but in some cases may be dispensed with, especially if the screw is very long. By this means is provided a simple and convenient iron handle, which can be readily removed and replaced without trouble.

An Old Telegrapher.

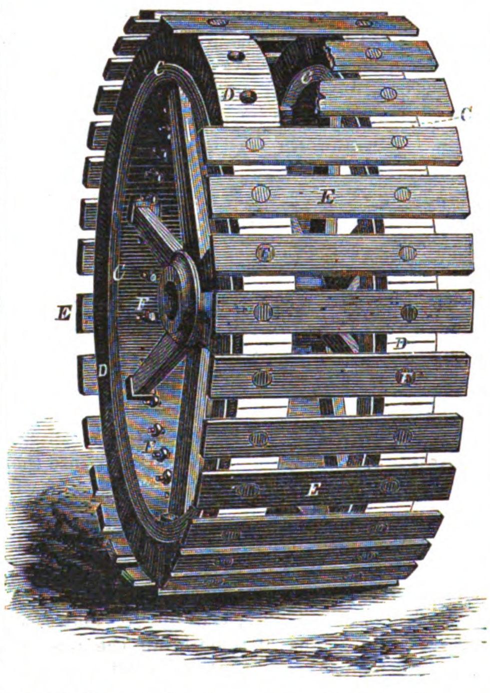
SIR FRANCIS RONALDS, now ninety years of age, is a member of the Society of Telegraph Engineers recently established in England. In 1818, Sir Francis proposed a system of electric telegraphy, and went to considerable expense in erecting miles of telegraph in his garden at Hammersmith. In 1823, he published a book, now very scarce, in which he said the day would come when the king at Brighton might communicate with his ministers in London as quickly as if he were himself in the metropolis.—*N. Y. Tribune.*

A GERMAN engineer, Herr Humann, is prosecuting antiquarian researches at Pergamus, under the direction of Prof. Ernst Curtius. He has unearthed a Doric colonnade leading to a Doric temple, with a spring of warm water under it, which is supposed to be the famous Æsculapium. Herr Humann has sent a great number of sculptures, coins, gems, and inscriptions to the Berlin Museum.

WILLIAMSON'S PATENT ELASTIC WHEEL FOR TRACTION ENGINES.

OUR engraving represents an improvement in wheels for traction engines, in which it is sought to combine all the advantages of wheels constructed with continuous rubber tires furnished with metal armor with greater cheapness, lightness, durability, and adhesive power than has hitherto been obtained with such devices. It was patented through the "American Artisan Patent Agency," Feb. 27, 1872, by Mr. D. D. Williamson, of No. 32 Broadway, New York City. Its construction will be understood from the subjoined descriptive sketch, having reference to the cut.

A cast-metal hub is furnished with two series of radial spokes, each series of the latter furnished with a rim, C, formed with flanges at its edges for the purpose of retaining the rubber springs, D, from lateral displacement. These springs, D, are placed side by side between the two flanges on the exterior surface of each rim and in each close together, thus forming a continuous circumferential set of springs. Extended transversely from each spring of each set to that one opposite in the other set is a metal or wooden plate or lug, E, the one material or the



other being used as may be preferred. Through each end of each plate or lug, E, and also passing through a hole in the spring beneath and through one suitably provided in the rim, is a bolt, F, secured in place by means of a transverse key in its inner end. It will be seen that the bolts retain the plates, E, in place to form the tread of the wheel, and in suitable relation to the springs and rims, to which latter the springs and lugs are of of course attached by the bolts, the latter being capable of longitudinal movement when the springs are lessened in length by compressive force exerted on the tread or periphery of the wheel.

When in operation, the weight of the vehicle of course compresses the springs toward or adjacent to the ground, and brings a number of the plates or lugs upon the latter to increase the bite or adhesion of the wheels. As the wheel revolves, this is of course repeated continuously, the springs returning the tread to its normal or circular form as fast as released from compression by rising out of the ground. The cost of the springs made and arranged in the manner described is much less than that of the continuous elastic tire; in case any one or more of them is injured, the same can be replaced at a comparatively slight expense; and when the traction engine is used on soft ground the wheel allows dirt, etc., which would otherwise clog its action, to pass freely through the spaces between the plates or lugs of the tread, and then through the space between the two annular series of springs, from which it passes freely out through the open sides of the wheel.

A Great Ice Company.

THE Knickerbocker Ice Company is the oldest, as it is probably the most successful, of the ice gatherers in New York City. Their ice-houses line the Hudson River all the way from this city to Albany. They own the monopoly of the ice harvest of Rockland Lake, and around its edge have erected very elaborate elevators and other appliances capable of securing 30,000 tuns a day. The total capacity of their houses is about 550,000 tuns, and this year every one is filled. Besides these houses, they own thirty barges of from 500 to 1,500 tuns each, and these have brought to this city 30,000 tuns for supplying the daily demand. The demand, of course, is very much modified by the heat of the summer. Last year, with a most abundant harvest, the irregularity of the hot weather left vast quantities of ice on the hands of the ice-men. In 1870, when the crop was the shortest for many years, the weather created a demand far beyond the capacity of supply, even by export. The ice-men say that reporters and newspapers that year cost the consumers of ice in New York $500,000. Daily reports were made of the scarcity, and as often telegraphed to the Maine ice-men, who alone were able to furnish it, and they forced up the price till it sold at $1 50 per hundred at retail, and they alone reaped the benefit, some of them making large fortunes from that year's transactions alone.

Turkish Telegraphy.

ACCORDING to a recent writer, "Telegraphs were introduced in Aleppo Syria a few years ago by the Government, and now reach about all the places of any importance; but let not any one suppose that telegraph means the same in Turkey that it does in America. The motto of everybody in this country is "*Yavash, yavash*" (slowly, slowly), and even electricity is handled by these phlegmatic Turks in accordance with their time-honored customs. Electricity is altogether too fast for the average followers of the prophet; but, as it pays no heed to "*yavash, yavash,*" after it is started, the Turkish operator delays the message as long as possible at one end, and the Turkish carrier at the other end waits till a quantity of telegrams have accumulated, and then devotes half a day to delivering the arrivals for the week. Let me mention a couple of cases that occurred under my own observation a few days ago. One gentleman telegraphed to Aleppo from Antioch, distant about one hundred miles by telegraph route, and got his answer in just forty-eight hours, though his agent in Aleppo answered immediately."

GENERAL IMBODEN, of Virginia, in a recent speech before a committee of the Legislature, said that half the land in Virginia was in the market at low prices.

AMERICAN ARTISAN

BROWN, COOMBS & CO., Publishers.

ISSUED WEEKLY AT

No. 189 Broadway, New York.

S. T. BROWN. J. W. COOMBS.

AGENTS.

AMERICAN NEWS COMPANY..................New York City
NEW YORK NEWS COMPANY.................. do
NEW ENGLAND NEWS COMPANY.................. Boston.
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WEDNESDAY, APRIL 3, 1872

THE AUSTRIAN WORLD'S FAIR.

THE international diffusion of industrial knowledge received a new and strong impulse from the London World's Fair of 1851. This impetus has been encouraged and continued by similar exhibitions held at intervals in various countries, and, in the main, so successfully that Universal Expositions may now be recognized as one of the most efficient means of promoting manufacturing, agricultural, and commercial progress in any country; and for diffusing to other lands the information obtained from a comparison of products, derived from widely distant portions of the earth. The next great international affair of this kind is proposed for Vienna, to be held in buildings especially erected for the purpose in the Imperial Park called the Prater. It will be opened on the 1st day of May, 1873, and closed on the 31st of October following. From the voluminous statement sent us by the Austrian Consul-General in New York, we infer that the design is to render the Exposition not in any wise inferior to the best and most extensive hitherto held.

The articles permitted for exhibition are divided into twenty-six comprehensive classes, this classification, however, not differing essentially from that commonly adopted on previous similar occasions. Accompanying the exhibition of machinery will be competitive trials; there will also be shown the condition of various industries at different periods, and it will also be attempted to illustrate how and to what extent machines have either superseded handwork or enabled the product of manual labor to be materially increased. There will also be illustrated in like manner the progressive application of science to the practical arts as shown in the utilization of waste. Especially in this will care be taken to show the present condition of manufactures as compared with that existing at the time of the first London Exposition. The progress of inventions and of industry, also the history of the prices of raw and manufactured materials, will receive thorough attention. There will also be given a representation of the trade and commerce of the world, and for this purpose samples of the articles of traffic from all important seaports are to be exhibited.

We have not space for a full statement of the programme laid down, but the forthcoming Viennese Exhibition, even aside from the matters herein previously mentioned, can hardly fail to be productive of much benefit to the arts and industries of all civilized lands by the determination of facts and dissemination of information on subjects concerning which little is at present known. For example, dynamometric experiments will be made on the tractive power of animals, in the hydro-extraction of grape-juice, and the heating of wines, the application of the electric light, practical uses of balloons, the relative utility of steam and horse plowing, and many others. Temporary exhibitions of certain classes of not very enduring products, like those of the dairy, are to be provided as adjuncts of the main Exposition, and are expected to give rise to discussions and experiments having a directly practical bearing on the subjects to which they refer. For instance, concerning dairy produce, trials will be made of new or suggested improvements in processes of making butter, cheese, etc. Upon the whole, the proposed Austrian World's Fair of next year seems to be laid out on a plan at once broadly comprehensive and well worked out in all its details, and we shall be much disappointed if it does not in many ways show a marked advance over its predecessors in other lands.

A NOVEL FIRE EXTINGUISHER.

THE use of water surcharged under pressure with carbonic acid gas has proved of such utility in putting out fires, when applied by the well-known portable fire extinguishers, that plans are rife to enlarge the field of its application. Most feasible among these is that of employing the same principle in powerful fire-engines, for there is no reason why a large tank should not produce a proportionally greater effect than a small one. Less likely to commend itself to popular approval is that of providing the carbonated water in pipes extending from some suitably located reservoir, and running through the walls and to the apartments of the buildings in the neighborhood, so that any room could be at once filled with the extinguishing agent by simply turning a stop cock. One would think that in this last the limit of plausible invention in this line was reached, as far as widening the scope of its operation is concerned; but we find going the rounds of the press a sketch of a still more radical project in similar connection, and which shows the manner in which an idea good in itself may sometimes be "run into the ground."

The projector of the new plan proposes to provide reservoirs containing the extinguishing agent, either strongly carbonated water, carbonic acid gas, ammonia, or sulphurous acid under compression, with pipes ramifying, as in the previous case, to the several rooms of a building, the pipe to each room being formed with an outlet closed ordinarily with a fusible plug. A thermometer is so combined with the wires of a galvanic battery that when the temperature, from the occurrence or proximity of fire, rises to a given point, the electric circuit is completed, a spark is passed to a combustible substance arranged around the fusible plug, the latter melts, and the issuing gas puts out the fire. But the inventor does not mention what the effect of the irrespirable gases set free without warning upon the sleeping inmates of a dwelling might reasonably be expected to be.

IMPROVEMENT IN PRINTER'S TYPE.

MANY attempts to make type-setting machines are said to have failed because their operation broke the type as universally made of brittle metal. To obviate this, type wrought from copper-wire were provided, and of course possessed the requisite strength, but another difficulty presented itself. Copper type cleaned in the usual manner and by the common methods of the press-room were found to corrode rapidly, and the composing machines for which they were designed undoubtedly long ago fell to fragments in the dust of neglected lumber-rooms, or were melted up as old metal for use in machines of more lowly purpose. But this was before benzine was cheap or well known enough to come into common employment as a solvent of oily material like printer's ink, and the adoption—quite generally of late years—of benzine for cleaning type opens the way for the use of copper type without drawback from the source just specified. Given, therefore, the mechanical means whereby type in specific and determined order can be rapidly conveyed from guides or cases to a galley by the touching of suitably arranged keys, no practical difficulty necessarily exists in securing the integrity and durability of the type so manipulated.

But with the use of certain colored inks, even copper-faced types are inadmissible in any case, owing to the corrosion of the copper surface by the chemical action of the ink. To preclude this, it has been proposed to face the type with nickel instead of the usual metal, thereby securing also a greater hardness and consequent durability in the sharp lines of the letters. But pure nickel is stated by some who have used it to be liable to flake or scale when the electro-plated coat is thin, and some of the nickel alloys, which, we understand, have been very successfully deposited, would, no doubt, give a tougher and therefore a more desirable non-corrosive surface to the faces of the type.

SAW-FILING.

WE notice in an exchange a sketch of a saw-filing machine, in which a reciprocating file is actuated by mechanism, driven, of course, by hand, and applied to sharpening the teeth of saws; the saw being meanwhile clamped in a suitable vise. The item called to mind a dozen, more or less, machines designed for like purpose that have been brought to our notice during the past four or five years, none of which seem to have met the approval of saw-mill men, whose patronage is essential to the introduction of any device of the kind. It appears to us that a reciprocating file, applied in the manner just previously herein indicated, can hardly meet the requirements of the case: first, because there is less labor in giving motion to and guiding the direction of the file, by grasping the handle direct, than by the intervention of mechanism; and, secondly, because no appliance of the kind will meet with much favor unless it can be used without taking the saw from its place, the removal and replacement of the saw on or in its bearings forming a very heavy percentage of the entire work.

Saw-filing machines may be included in a large class of apparatus the subject of continual experiment, but the source of very infrequent success. To prove of much utility, the device must be capable of being very readily applied in proper relation to the saw, without changing the latter from its normal position, and should be capable of very rapid operation by means of a crank-power. Its filing or abrading surface should be of the most durable character, and for this some artificial stone or emery composition will doubtless give better results than any metal surface roughened with file teeth. We admit that it will probably be a long time before the intermittent squeak of the file will cease to denote the periodical sharpening of a saw-mill saw. But the production of a practicable machine for the purpose is, of course, possible, and we refer the matter to the large number of inventors who delight in grappling with difficult mechanical problems.

ON THE APPLICATION OF ELECTRICITY TO THE REGULATION OF RAILWAY TRAFFIC.

BY F. L. POPE, ELECTRICAL ENGINEER.*

(Concluded from page 203.)

A SPECIAL telegraph wire and an operator at each signal station are required by the system described in the earlier portion of this paper. The practical working of it is as follows :—

As a train approaches within a quarter of a mile of a signal station, the whistle is sounded as a notification to the operator on duty at that point. If he has received word that the preceding train has reached the next station, he pulls the cord showing the white signal, indicating that the line is clear, and the train goes forward. As soon as the last car has passed and he has seen the red flag or light at the tail of the train, he notifies the last station back that the train has passed. Should he not see a red flag or light on the last car, it would indicate that part of the train had been uncoupled and left on the road, in which case he telegraphs to headquarters for special instructions.

In the absence of information of the arrival of the preceding train at the next station, the operator is not allowed to give the "all-right" signal, and the approaching train is required to stop for explanations or proceed under proper regulations, with the expectation of finding the track obstructed.

In this system, reports of the time of passing of each train are telegraphed from each station to the next adjoining one in either direction, and also by a separate wire to the office at headquarters, where it is recorded on a train sheet, as in the first-mentioned case.

It will be observed that this arrangement, when properly carried out, affords almost absolute safety. No engineer must pass a station until the white signal is shown. No operator must show the white signal until he has received positive information that the whole of the preceding train has passed the next station. Nor must he telegraph back such information to the last station until he has certainly ascertained that the whole of the train has passed. Nothing is left to chance, or to the judgment of the operator or engineer. Two or three plain and simple rules comprise the whole system.

The only objection that can be urged against the general adoption of this system is that of expense. At least two telegraph operators are required at every station to attend the signals day and night, and the stations on some roads would require to be very numerous. This fact has led to the invention of automatic signals, which are operated directly by the train itself, through the agency of electro-magnetism, requiring no attendance except to see that they are kept in working order.

Other applications of these electric signals have been made for railroad purposes besides that just alluded to, and it may be of interest to state briefly some facts in relation to them. A very large number of devices of this kind have been patented in England during the last twenty years, few of which, however, possess any valuable features.

The first American inventor who seems to have turned his attention to this subject was Thomas S. Hall, who patented, in 1867, an electric signal and alarm bell to be used in connection with a switch or drawbridge. This was so arranged that the displacement of a rail at these points would exhibit a danger signal at a distance of half a mile or more in each direction; while at the same time the bell would ring continually until the track was replaced in its original position, thus certainly attracting the attention of every one employed about the place. This was a good idea, but was wrongly carried out; for by his arrangement a break in the conducting wire or the failure of the battery would render the whole apparatus inoperative, a fact of which no evidence would appear until the moment it was needed. It would obviously be unsafe to depend implicitly upon the indications of a signal which might, under some circumstances, show no sign of danger, even when the switch or draw was displaced. The only alternative was to reverse the plan, so as to keep the electric circuit continuous as long as the track was continuous also, and exhibit the danger signal by the interruption of the current, in which case any failure of the apparatus itself would give a danger signal and call attention to the defect. This plan involves the necessity of keeping the battery in action nearly the whole time, and is therefore attended with much trouble and expense in its maintenance.

A subsequent inventor, Mr. William Robinson, surmounted this difficulty by a very ingenious arrangement, which was patented in 1870. In his plan, the circuit is kept continuous at the bridge or switch itself as long as the track is in its proper position, but is interrupted at a point a little in advance of the position of the distant signal. When the approaching train reaches the point just mentioned, its wheels press a lever placed near the rail, and the "safety" signal is exhibited to the engineer, unless the circuit is also interrupted at the switch. If this is the case, the signal remains in its normal position, that of "danger," and the engineer governs himself accordingly. The details of this arrangement present some novel features. It will at once be seen that the mere momentary contact of the successive wheels of a rapidly moving train with the circuit-closing lever would not suffice to make an electrical contact of the necessary duration to raise a signal with certainty. Mr. Robinson therefore uses an electro-magnet, so arranged as to keep its own circuit (which is also the signal circuit) closed continuously after contact has once been made, no matter for how brief a period; and this circuit remains thus closed until the train arrives at the switch or drawbridge, when it presses another lever, breaking the circuit, and the signal is released.

The same inventor, in 1870, took out a patent for a signal and alarm to be placed at highway crossings and arranged on a similar principle. When within a suitable distance of the crossing, the train was made to press on a lever, closing the circuit and elevating a suitable signal, while at the same time an electric bell was rung until the circuit was broken by another lever at or near the crossing. Some of Mr. Robinson's signals, I believe, have been put in practical use on the line of the Philadelphia & Erie Railroad.

In 1871, Mr. Hall also brought out a crossing signal, worked by levers in proximity to the rail, but differing in the details of its construction. The result produced was similar to that just referred to. Some of these signals were erected at different road crossings on the Hartford & New Haven, New York & New Haven, and Flushing & North Side Railroad.

During the past year, Mr. Hall has put in operation a system of automatic electric block signals upon the Harlem Railroad, between the Grand Central Depot in this city, and Mott Haven Junction. This distance is divided into sections of a mile or more in length, and a signal-house is placed between each two sections, the arrangement being analogous to that already referred to in the New York & Philadelphia line. The normal position of each signal is at "safety." When a train passing over the road reaches one of these signals, its wheels press upon a lever, closing an electric circuit and exhibiting the danger signal. By a simple mechanical contrivance, the circuit is kept closed and the danger signal is displayed until the train reaches the next signal and operates upon that in the same manner. The movement of the second signal is made to close a separate electric circuit, running back to the one last passed, releasing the latter and allowing it to assume its normal position indicating "safety." A bell is kept constantly ringing in each signal-house as long as the signal remains displayed. This is done by a separate battery brought into action by a relay.

The mode of closing an electric circuit by the passing of a moving train, which has been described in conjunction with the inventions of Robinson and Hall, is open to one very serious objection. An express train running at the rate of thirty miles an hour—which is by no means an exceptional rate of speed—moves not less than 44 feet per second. Imagine the effect upon these levers of from thirty to sixty wheels, each of which is a hammer of many tuns, moving at the rate of 44 feet per second, and this operation repeated perhaps fifty times every day. Any one at all familiar with railroad practice will readily be convinced of the fact that no arrangement of this sort that can be devised will withstand such rough usage for any great length of time.

About a year since, my attention was called to this difficulty of closing the circuit by means of a rapidly moving train, in connection with an improved form of semaphoric signal which had been invented by Mr. S. C. Hendrickson. In seeking to devise some more certain method of accomplishing the desired result, it occurred to me that the rails of the track might in some way be brought into the circuit, so that the connection could be formed by the contact of the wheels of a passing train with an insulated section composed of one or more rails. Several years ago, out of mere curiosity, I had tried the experiment of transmitting electric currents, and, in fact, of telegraphing through the fish-jointed track of the New Jersey Railroad between Elizabeth and Rahway, N. J., with entire success. On this occasion, the earth in which the ties were imbedded, as well as the ties themselves, was in a tolerably dry state, and, therefore, afforded a fair degree of insulation, when compared with the great conductivity of the rail, which I roughly calculated to be from 300 to 400 times as great as that of a No. 9 iron wire, such as is ordinarily used in the construction of telegraph lines.

In the fall of 1871, I made a practical test of this method of operating a signal at East Cambridge, Mass., on the line of the Boston, Lowell & Nashua Railroad. A section of track, 42 feet in length, was separated at each end, by an insulated joint, from the adjacent rails of the continuous track in each direction, and a circuit of wires was formed, which included the battery and electro-magnet for operating the signals, the two ends being attached to the respective opposite rails of the insulated section of track. On the passage of a train, the rails became electrically connected by the metallic wheels and axles of the locomotives and cars, and the signal was thrown into position, indicating "danger" to the next following train. The signal

* Paper read before the New York Society of Practical Engineering, March 13, 1872.

was arranged so as to be held in this position by a detent, after the train had passed and the circuit was broken. Upon the arrival of the train at the next station, it closed a circuit at that point in precisely the same manner, and a current was thereby sent from a battery at that station back to an electro-magnet, which lifted the detent of the first-mentioned signal, which allowed it to resume its normal position of safety.

An experience of nearly five months of actual service in operating an experimental signal upon this principle shows that it is almost absolutely certain in its operation; while it will be apparent upon inspection that, even in the event of its failure to operate, there is no more liability to accident than exists under the present system. The danger signal, once set by a train as it passes a station, cannot be changed to safety except by the arrival of the train at the next station, because the battery current for releasing the signal must come from there, and can only be transmitted by the closing of the circuit by the train itself. If the battery fails, or the wire is interrupted, the signal remains at "danger," and the following train is warned to proceed, if at all, with extreme caution, expecting to meet with obstruction.

If a system of safety signals of this kind can be made at once inexpensive and reliable in its operation, its great value is so apparent as to scarcely need any demonstratian. Experience has shown that it is not safe, all things considered, to allow trains to follow each other at the usual rate of speed—say 20 miles or upward per hour—at an interval of less than about seven minutes apart, as in case of an accident or stoppage of a train on the road from any cause, it will require as much as seven minutes for a flagman to go back a sufficient distance to warn the following train of the obstruction in season to prevent a collision. It may also be observed that in the confusion attending an accident this precaution is sometimes forgotten, and instances have been known where the signal, even when sent back, was not seen by the engineer of the approaching train.

With a proper system of signals, erected at intervals of a mile, it would be possible to run trains at intervals of three minutes apart, with far more safety than they can be run at seven minutes apart under present conditions; for it would be absolutely certain that no train could approach within a mile of another one, provided the signals were observed. The capacity of a road would thus be more than double, at a very insignificant expense, compared with the expedient of laying down a third track, as is now being done by some of the principal roads running out of Boston, and a greater degree of safety would at the same time be assured.

The system which has been described would not, of course, supersede any of the precautions now in use, but would serve as an additional security. Its applications to tunnels, highway or grade railway crossings, and other dangerous points, are mere matters of difference in detail, which need not be dwelt upon at length in this paper.

In concluding my observations upon this subject, I cannot refrain from mentioning the great credit that is due to some of the leading railway companies in the United States for the prominent part they have taken in the introduction of nearly every important improvement in practical telegraphy which has been made during the past ten years. The use of wires of large size and superior strength and conductivity was commenced by Mr. Tubbs, of the Chicago, Burlington & Quincy Railroad, many years ago, in the face of strenuous opposition on the part of the officers of the commercial telegraph companies; and the good results were so marked as to lead to its continued use by that company in its subsequent construction. Not until last year did the Western Union Telegraph Company commence to use large wire. The Brooks paraffine insulator, which enables a telegraph line of almost any length to be operated without the slightest difficulty in the most unfavorable weather, has been used for several years with entirely satisfactory results by a dozen or more of the principal railroad companies. The Western Union and other commercial companies still continue to use the old glass insulator of a quarter of a century ago, and the result is a great delay, sometimes a total stoppage of communication during the continuance of every rain-storm—an inconvenience quietly submitted to by the public under the erroneous impression that it is unavoidable. So in the matter of batteries, the commercial telegraph lines still cling to the costly and inconvenient nitric acid combination, apparently for no other reason than because Morse used it on his first line between Baltimore and Washington, while the railroad companies have long since adopted the simple, economical, and effective gravity battery. Other examples of the same nature might be adduced, but enough has been said to show that the managers of the leading American railroads are fully alive to the importance of the employment of that invaluable agent, electricity, in its application to the management and control of their rapidly increasing traffic. A few years will probably witness the general introduction of some system of signaling resembling that which I have endeavored to describe, and which will become an indispensable adjunct to the operations of all roads running a large number of trains in rapid succession over the same track.

NEW AMERICAN PATENTS.

We give, as follows, notices of some of the most interesting inventions for which Letters-Patent of the United States have recently been issued:—

Corn Harvester.—J. H. Besant, Point of Rocks, Md., and M. B. Atkinson, Georgetown, D. C.—*March* 19; ante-dated *Feb.* 29.—This corn harvester is provided with a sickle sled and tilting platforms pivoted near their outer edge, and with pairs of disks, the disks of each pair being inclined toward each other and to the rear, and having oblique tines.

Street Lantern.—J. Cook, New York City.—*March* 19.—The essential feature of this invention is found in the use of an exterior upper and lower reservoir, connected together by a pipe with a cock in it, to admit and stop the flow of the fluid from the upper to the lower reservoir, the lower one being provided with means by which to determine when it is filled, and upper and lower apertures by means whereof to clean it, in combination with a pipe from the bottom of the lower one, to which to attach a burner and the wire-gauze bottom.

Base-burning Steam-boiler.—Z. S. Durfee, New York City.—*March* 19.—The most noticeable characteristic of this improvement exists in the construction and operation of vertical steam-boilers with internal base-burning fuel chambers and brick water-casings, in such wise that the boiler and fuel chambers may be nearly or quite surrounded by the heat developed on the grates and in the combustion-chamber.

Machine for forming Auger-bits.—W. A. Ives, New Haven, Conn.—*March* 19.—This inventor claims, in the process of forming the cutting end of boring instruments, the arrangement of two dies, the one within the other, the inner or central die operating to form the point and floor lip or lips, the outer passing over the other or inner die to turn up and size the lip or lips. In combination with these is also claimed a holding-die. Also, in the combination with the mandrel, spindle, and carrying-dies, the use of cams so as to operate the said dies.

Mode of coking Fossil Coal.—G. Lander, Irwin, Pa.—*March* 19.—This comprises the utilization of the slack of that species of coal not having sufficient bitumen to admit of its being coked by any known process, by intermixing with such slack a sufficient quantity of bituminous coal or the slack thereof, and then subjecting it to a peculiar treatment to secure the requisite coking of the whole.

Waterproof Cloth for Carriage-tops.—A. M Whipple, North Adams, Mass.—*March* 19.—This new article of manufacture comprises a single fabric, all cotton on one side, and all wool, silk, or other material, that will hold a permanent dye, on the other side. There is also claimed an enameled or rubber duck, drill, or muslin, with a woolen or silk back woven with it, so as to be not exposed to the paint surface, and yet form a perfect lining.

Rotary Heel for Boots and Shoes.—A. O. Crane, Boston, Mass.—*March* 19.—Aside from certain minor points, the more important characteristic of this invention is found in a plate of metal or other material fastened upon the heel seat of a boot or shoe, fitted to an excavation upon the rotary or tread part of said heel, and having a mortise to receive and hold from revolving the fastening stud upon which said tread-part revolves.

Water-filter.—F. Henshaw, Washington, D. C.—*March* 19.—In this apparatus are used upper and lower screens, both of less diameter than their cylinder, in combination with a central compressing rod, adapted to draw both screens toward the center. Certain other and adjunctive devices are also claimed, and also a particular method of filling the screens and packing sand between the same under water.

Burial-case.—R. J. Howdon, Cincinnati, Ohio.—*March* 19.—The most prominent among the several novel features of this improved burial-case is its construction in part of sheet-metal and in part of cast-metal, the sheet-metal being soldered, or in like manner hermetically connected, to narrow strips of sheet-metal projecting from the cast-metal parts.

Rubber Filling for Grooves of Transmission Wheels.—W. A. Roebling, Trenton, N. J.—*March* 19.—This invention embraces the combination of a skin of soft rubber on a core of hard rubber in the filling used for lining the grooves of transmission or other rope wheels, and made of any length.

Safe.—M. C. Boyer, Norristown, Pa.—*March* 19.—This invention includes a reservoir consisting of a detachable double casing arranged within a pit adapted to receive a safe, and supplied with water. Also, the combination of the said safe and its raising and lowering mechanism with the water reservoir, and a sliding-plate for closing the reservoir and supporting the safe when elevated from the reservoir.

Heating Furnaces with Hydrocarbon Liquids.—J. K. Caldwell, Philadelphia, Pa.—*March* 19.—This furnace is constituted by the combination of one or more burners, each consisting of two nozzles exposed to the air, one nozzle for discharging a jet of steam across the orifice of the other nozzle, which communicates with a supply of petroleum or other equivalent hydrocarbon.

Paper Board for Buildings, etc.—F. N. Davis, Beloit, Wis.—*March* 19.—This new article of manufacture is a building paper or board made in continuous lengths, either plain, or fireproof, or waterproof, and having a wall-paper finish. The claim also covers a method of giving the wall paper finish to the material.

Collecting and using the Waste Gases from Blast-furnaces.—J. E. A. B. de Langlade, Bordeaux, France.—*March* 19.—This invention is set forth as comprising the utilization of the gases of blast-furnaces for the heating of any furnaces or other apparatus, by causing these gases to pass into the Siemens or other regenerator. Certain supplemental features are also claimed, among them a method of washing and purifying the gases.

Dome for Hot-air Furnaces.—B. Gommenginger, Rochester, N. Y.—*March* 19.—The pecu-

liarities of this novel furnace consist in the construction of the radiating drum of a hot-air furnace with a ring provided with covers, which alternate in position, said ring serving the double purpose of a partition and a damper. Also, the construction of the base of the drum-space of convex or arch shape, when combined with the ring and its covers. Also, a novel arrangement of suitably provided ash-holes.

SEWING-MACHINE MOTOR.—C. F. Greer, Georgetown, D. C.—*March* 19.—This improved sewing-machine motor consists of an inclosing case, with in which are two springs mounted upon and at opposite ends of the main shaft, the driving gear, intermediate gearing mounted upon short countershafting extending but part way across the case, the balance-wheel and the regulator, and in which the shafting is set on a horizontal line at or about midway between the top and bottom of the casing.

SAFETY-HOOK FOR WATCH-CHAINS.—G. Leigh, Providence, R. I.—*March* 19.—This is a snap-hook and swivel made from a blank or blanks consisting of single pieces of metal, having the requisite form and disposition of metal. There is also claimed in combination with the snap-hook, made as described, of a peculiarly constructed locking device.

BELT.—Jacques Edmund Bazault, Paris, France. —*March* 26.—This invention, which is applicable to various articles for encircling the body and limbs of men and animals, including belts, waistcoats, corsets, breast-pieces, caps, and bracelets, consists in a novel construction of such articles by filling or packing them with oxyd of iron, or iron sand which may be found in a natural state, or magnetic mineral iron reduced to a powder, whereby, on said articles being worn about the body or limbs, the same will prove a specific against sea-sickness and against various other affections or diseases both on land and water and in mines, including yellow, typhus, and other fevers.

COTTON CULTIVATOR.—Nels F. Sendelin, Mott Haven, N. Y.—*March* 26.—This invention relates to a draught machine or vehicle for cultivating cotton, by weeding and breaking up the earth between the rows, and throwing the loosened earth up over or about the roots of the growing plants, and the invention consists in a vehicle for said purpose, constructed to operate on opposite sides simultaneously of each row of growing cotton by means of two gangs of weeders and plows. These gangs are set angling and adjustable to adapt them to different inclinations in the sides of the row or as other circumstances may require, and are furthermore made capable of being moved about from side to side to adapt them to crooked rows or deviations from a straight path or course in the travel of the vehicle over the ground. The horses or cattle are hitched to the vehicle so that they walk on opposite sides of the row, and the vehicle is constructed of the necessary width to admit of its operator upon each row in succession.

PROPELLING CARS ON STREET RAILWAYS.—Joseph L. Simms and William T. Duvall, Georgetown, D. C.—*March* 26.—This invention consists in an arrangement of posts or pillars at suitable distances apart between the two tracks to support a series of endless chains horizontally over the said tracks, which chains are put in motion by steam or other stationary power, applied at intervals to operate the carrying wheels at the termini of the sections; said wheels being geared together, the power is transmitted from section to section through the entire route, or as far as it is capable of operating it. It also embraces various mechanical devices for connecting and detaching the car from the traction chain automatically, at the junction of the sections thereof. By this arrangement the weight of a car descending a grade is made available to aid another on its ascent on any portion of the route.

KILNS FOR BURNING POTTERY WARE, ETC.—George C. Hicks, Baltimore, Md.—*March* 26.—This invention consists in the construction of a closed kiln for burning pottery and similar wares, wherein oxygen is supplied to support combustion by a forced blast, by which a uniform pressure and temperature is obtained throughout the kiln, and the loss from unequal expansion and consequent cracking of the wares is almost if not entirely obviated.

APPARATUS FOR TREATING SEWAGE.—Henry Headley Parish, Rome, Italy.—*March* 26.—The invention relates to chemical means and appliances for deodorizing, disinfecting, and for converting into manure sewage and other fecal matters, whether human, animal, or vegetable, of solid or liquid form. It consists in a compound composed of charcoal and slacked lime, combined in certain proportions whereby the ends above enumerated are attained. It also consists in a novel means for carrying out the process.

SONNETTE.—George W. Sherman, Brooklyn, N. Y.—*March* 26.—This invention relates to sonnettes or clappers such as are used as musical accompaniments. It consists in the novel construction of a sonnette or clapper with a spring tongue and attached hammer, whereby a louder and more lively action is obtained, and the action is brought under the more perfect control of the player.

TREATMENT OF CRUDE OILS.—Charles C. Mengel, Brooklyn, N. Y., and Alois P. von Poehrnhoff, St. Catharine's, Canada.—*March* 26.—This invention consists in a novel process of treating crude oil or petroleum for illuminating and other purposes, by causing water in its liquid state, or liquids containing water, to be admitted drop by drop above or on the surface of the crude oil in the still, as or after said oil has been heated to the point or degree of distillation, and whereby the distillate may be deodorized without the use of lead and sulphur.

WASHING MACHINE.—John Key, Union City, Ind.—*March* 26.—This invention consists in the combination with a tub or trough, having a smooth bottom of inverted arched form, of notched and slit rubbers or washers pivoted radially to a shaft at the center of the arc of the tub bottom, so as to work alternately along it under the clothes to be washed, and effect their cleansing by turning them over and over, and repeatedly expressing the water from them, and allowing them to become saturated again.

HOISTING APPARATUS.—Nathaniel S. McFarland, Brooklyn, N. Y.—*March* 26.—This invention relates more particularly to double hoistways, in which two cars are arranged to travel in reverse directions simultaneously, and connected so that the one car counterbalances and operates the other by means of chain, with which either car alternately is loaded. The invention consists in various novel combinations and arrangement of parts, whereby great efficiency and other advantages are obtained for said hoisting apparatus, and the cars are made to travel with an accelerated velocity. The invention also includes a novel and advantageous construction of brake for arresting the motion of either car by clamping or clipping the opposite sides of the guides up and down which the car travels.

POINT FOR DRIVEN-WELL TUBES.—Wm. D. Andrews, Brookhaven, N. Y.—*March* 26.—This invention relates to driving ends or "points," provided with guarded induction springs, used for forming and operating driven wells. The invention consists in a ribbed or corrugated construction of the body of the "point," having a perforated covering surrounding it, with passages between the corrugations and openings into the interior of the body. A driving end or "point" thus constructed is capable of being easily entered into and withdrawn from the earth, likewise affords protection against contact with the earth of its body or perforated covering, excluding sand and other matter from pressing on the covering or passing through its interstices, and, in addition to presenting a free and large inlet area for the water within a small compass, possessing sundry other advantages.

ABOUT twenty million pounds of foreign wool (from South America, Australia, and the Cape of Good Hope) is now on its way to this country. A portion is overdue and is daily expected. This quantity constitutes the bulk of that expected for the American market for nearly a year to come.

IT is proposed to call at an early date a Grand Meteorological Congress in Vienna. The internationalization of scientific knowledge, as applied to navigation, commerce, agriculture, and arts, has grown wonderfully since the famous Brussels Conference of 1852.

BRIEF NOTICES.

PLACER diggings have been "struck" on the Colorado River, and pan out half an ounce to the man per diem.

THERE is news from Japan that a daily mail has been established between Yeddo and Yokohama. The railroad will be opened soon.

THE miners are hopeful in the Utah silver districts. The snow is rapidly disappearing from the canyons, and business promises to be brisk.

THE price of printer's type is now about the same as in 1864, and from thirty to forty per cent. higher than before the war. The trade is lively, and profits are good.

MINUTE crustaceans imbed themselves in the gutta-percha of the telegraph cables in the China Seas, and in several instances have destroyed their insulation.

THE legal voters of Montpelier, Vt., want Mrs. George W. Reed to be school superintendent, and she declares she won't. And so there is a dead lock at last accounts.

SHARP dealers in Tennessee buy poor sheep in the country for one dollar, sell the pelts in Knoxville for two and a half, and send the dried hams as choice venison to Chattanooga.

THE trains on the European and North American Railroad were blocked by snow on the morning of March 24. Three engines and a snow-plow from Bangor, Maine, helped them out.

COUNCIL BLUFFS and Omaha are quarreling as to which is the legal eastern terminus of the Union Pacific. If the courts decide in favor of the Bluffs, Omaha says she will tear up the track.

DENVER, Colorado, has subscribed $30,500 to start a beet-root sugar farm and factory. Beets grown on the plains have developed highly saccharine qualities where the alkali soil has not interfered with them.

THE Harvard boat crew are going to have a new boat. It will be so made that the different weights of the men shall trim her, and the outriggers will be arranged with reference to each individual aboard.

ACCORDING to a Prussian newspaper, a carpenter and a mason in Berlin have been sentenced to prison for eighteen months because they built a house that tumbled down. Nobody expects such justice to be done in New York.

THE principle of a proposed submerged bridge across the Bosphorus is that of a tubular tunnel, 360 meters long, 3 meters wide, and hung in anchor chains 9 meters below the surface, making for the coasts on either side with a gradient of 1 in 50.

THE famous mule that hauled the trolleys in the 1,100-foot level of the Belcher mine at the Comstock Lode lately got lazy and would not work any more. Another mule has been sent down, and the animal on strike relegated to private life on the surface.

ACCORDING to the New York *Times*, "the number of miserable clerks out of employment in New York City is lamentable." If these men had knowledge of mechanical occupations, it would lighten their hardships, and be better for the industries of the country.

A GERMAN, with an unpronounceable name, proposes to convert sawdust into grape-sugar by a well-known process, and then ferment and distill the sugar solution for the manufacture of brandy. One hundredweight of sawdust, he says, will yield seven gallons of strong brandy.

The Largest Vineyard in California.

THE largest vineyard in California is the Buena Vista, in Sonoma County, where there are 500 acres of vines. The whole tract belonging to the Buena Vista Vinicultural Society covers some 3,000 acres, on which there are several creeks, and sulphur, iron, and soda springs. An avenue a mile long leads to the houses, and on both sides are planted three rows of locust and mulberry trees. Of the latter there are some 3,000, exclusive of cuttings. The dwellings, men's quarters, carpenter-shop, blacksmith-shop, stable, etc., are all separated so as to prevent the possibility of a heavy loss by fire. The company make different classes of red and white wine, and 160,000 gallons were produced there in 1871. Sparkling wines are made with the foreign varieties of grape. The press-house, near a hill, is three stories high and 100 feet square. The grapes are brought around on the side of the hill, and crushed in the upper story, while the juice is carried by pipes to the vats below. From this house three tunnels or cellars, 100 feet long each, are run into the hill for the purpose of storing the wine. The champagne house is also three stories high, and from it are two long tunnels running into the hill, containing at present about 60,000 bottles of sparkling wine.

One one side of the creek, near the press-house, is the cooper-shop, where all the casks, which are made from the best Eastern wood, are put together, and on the other side is the distillery where the brandy is made. In the press-house cellars are large tanks holding from 1,000 to 2,000 gallons each, where they have wine from the vintage of 1866 to date. Tunnel No. 3 is what they facetiously term the "library," where they have casks of different kinds of wine of a variety of ages for the visitors to sample. On the main creek is the Willow House, where all the champagne baskets are made from willows grown on the ranch. They employ from 40 to 100 men, according to the season, and have at present 46 at work. Every department has its "boss," who brings his report nightly to the superintendent, Mr. E. P. Cutter. The manager of the cellars is Mr. A. Ketz. There are at present about 230,000 gallons of wine in the big cellar.—*Pacific Rural Press.*

Sugar from Grapes.

GRAPE culture has become so extensive in California that some growers are at a loss to know how to profitably work up their surplus product. Recently in Tulare County, good success has attained experiments in drying grapes for raisins, no less than five varieties being found suitable for the purpose. But the manufacture of saccharine substances from ripe grapes is now exciting some attention, and it is found that not only can a sweet viscid substance be obtained simply by boiling the juice, but that crystallized sugar can be easily manufactured therefrom. For this purpose the sweetest varieties of grapes are allowed to hang on the vines until they begin to shrivel. They are then picked, rapidly pressed, and the juice boiled to a thick sirup before any chemical change can take place. The sirup is placed in tight casks and allowed to stand for four or five months, at the end of which time about two-thirds of the mass is found converted into sugar. This product is not nearly as sweet as ordinary cane-sugar, being in composition identical with that made by a peculiar process from potato starch, but it is manifestly much more likely to be pure and of a better taste. The abundance and consequent cheapness of all kinds of fruit in California afford great inducements for its use in the manufacture of new products, and the full development of this field of experiment and research would, in one way or another, add much to the agricultural and industrial progress of the State.—*Evening Mail.*

Waterproof Glue.

MIX a handful of quick-lime with four ounces of linseed-oil; boil them to a good thickness, then spread it on tin plates in the shade, and it will become exceedingly hard, but may be easily dissolved over a fire, as glue, and will join wood perfectly.

Another strong and fine glue may be prepared with isinglass and spirits of wine thus:—Steep the isinglass for twenty-four hours in spirits of wine or common brandy; when the menstruum has opened and mollified the isinglass, they must be gently boiled together and kept stirred till they appear well mixed, and till a drop thereof, suffered to cool, presently turns to a strong jelly, then strain it while hot through a clean linen cloth into a vessel, to be kept close stopped; a gentle heat suffices to dissolve the glue into a transparent and almost colorless fluid, but very strong, so that pieces of wood glued together with it will sooner separate elsewhere than in the parts joined. —*Coachmaker's Monthly.*

Some Famous Ships.

THE Boston *Advertiser* in recounting the history of the *Great Republic*, which was built at Donald McKay's shipyard in Boston, says:—"Here have been built more fast clipper-ships than in any other shipyard in the world. Here was launched the *Lightning*, the fastest ship ever known. She made the trip from Melbourne to Liverpool in sixty-eight days, a time that has never been equaled by a sailing-ship. The *James Baines* and *Champion of the Seas* were sister ships, and at the time of the great Sepoy mutiny sailed from Portsmouth, England, with troops on the same day, and after one hundred and thirty-eight days entered Bomby on the same evening and at the same hour. Here originated that famous series, the *Sovereign of the Seas*, *Empress of the Seas*, *Champion of the Seas*, and *Glory of the Seas*. Mr. McKay has built one hundred and fifty ships, and in the year 1855 and 1856, within fourteen months, fourteen were launched from this yard. Those were the palmy days of this now neglected branch of American industry, when our yards were the glory of the nation and the envy of the world. The last ship launched by Mr. McKay was the *Glory of the Seas*, in 1869. She is of two thousand one hundred tuns, and the largest ship now sailing under the American flag. Since then the yard has been silent and deserted."

THE Strait of Canseau, between Nova Scotia and the Island of Cape Breton, is two and a half miles wide. This strait it is proposed to tunnel at an estimated expense of two and a half millions of dollars, in order to connect the railways of Cape Breton with the main land. This scheme is proposed as part of a plan to run steamers from Glasgow to Louisburg, the most easterly open port of Cape Breton.

THE "blue spring" in Florida has a bottom eighty feet wide, and its outflow makes a river large enough for a steamer to float upon.

METAL MARKET.

[*Corrected weekly for the "American Artisan."*]

NEW YORK CITY, Saturday, Mar. 23, 1872.

IRON.

Pig, Scotch, No. 1 (cash), per tun	$33 00	@	35 00
do. American, No. 1 (cash)	35 00	@	36 00
do. do. No. 2	33 00	@	34 00
Swedish, ordinary sizes	105 00	@	120 00
Common	72 50	@	77 50
Refined	77 50	@	85 00
Rods	82 50	@	120 00
Horse-shoe	95 00	@	— —
Hoop	100 00	@	145 00
Scroll	100 00	@	125 00
Nail-rods, per lb	— 6¾	@	— —
Spring	— 7⅜	@	— —
Tire	— 7½	@	8 —

STEEL.

Bars, best cast, warranted, per lb	— 18	@	— 19½
Sheet, do	— 16	@	— —
do. second quality	— 15½	@	— —
do. third quality	— 12	@	— —
Saw-plates. circular	— 20	@	— 30
Double-shear, warranted	— 18	@	— —
Single do	— —	@	— —
Montague & Co. (cast bars)	— 15½	@	— —
Machinery, round	— 11	@	— 13
German, best	— 11	@	— —
do. goat	— 10	@	— —
do. eagle	— 9	@	— —
Blister, warranted	— 14	@	— —
do. common	— 10	@	— —
Jessop & Sons', common	— 17	@	— —
Double-refined	— 26½	@	— —
Stone-ax shapes	— 26½	@	— —

ZINC.

Mussulman and American, per lb	6½	@	— 9
Solder, per lb	— 22	@	— 23
Antimony	— 16	@	— 17
Spelter	— 7	@	— 7½
Copper, old	— 17	@	——
Brass, do	— 14	@	— —
Nails, roofing, per keg	7 50	@	— —
do. do. tinned	12 50	@	— —

LEAD.

American, per 100 lbs	7 50	@	8 00
German	7 50	@	8 00
Bar	8 50	@	9 00
Pipe and Sheet	8 50	@	9 00

PROSPECTUS
OF THE
AMERICAN ARTISAN.

VOL. XIV. NEW SERIES. 1872.

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WEEKLY JOURNAL OF ARTS, MECHANICS, MANUFACTURES, ENGINEERING, CHEMISTRY, INVENTIONS, AND PATENTS.

olume XIV. New Series. } Number 15. NEW YORK, APRIL 10, 1872. { $2 00 Per Annum in Advance. Single Copies, Five Cents.

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[Illustrations are indicated by an asterisk.]

BRIEF NOTICE.

An aerolite weighing one hundred pounds fell, the other day, at Atchison, Ky.

Ten men were injured by an explosion in a colliery at Locust Hill, near Ashland, Pa., on March 25.

During the past four years, the Erie Railway has brought forty-two thousand million gallons of milk to New York City.

The cotton-mills at Columbus, Ga., have thirty thousand spindles running, and pay from fifteen to twenty per cent. on their capital.

Argentiferous galena has been discovered on the Boulder Slope, Montana. The percentage of silver is low, but the quantity of lead is great.

The miners who stopped work at the Grass Valley, Cal., mines because of the introduction of dynamite, have recalcitrated and gone back to their employment.

In a recent bull-fight at Bilbao, in Spain, a velocipede was substituted for a horse by one of the picadors "with the most triumphant results," but whether for the bull or the picador is not stated.

Sham diamonds of great size and luster are now manufactured in Birmingham, England, and sent out to the South African fields for "salting" claims, just as California diggings used to be sometimes salted with brass filings.

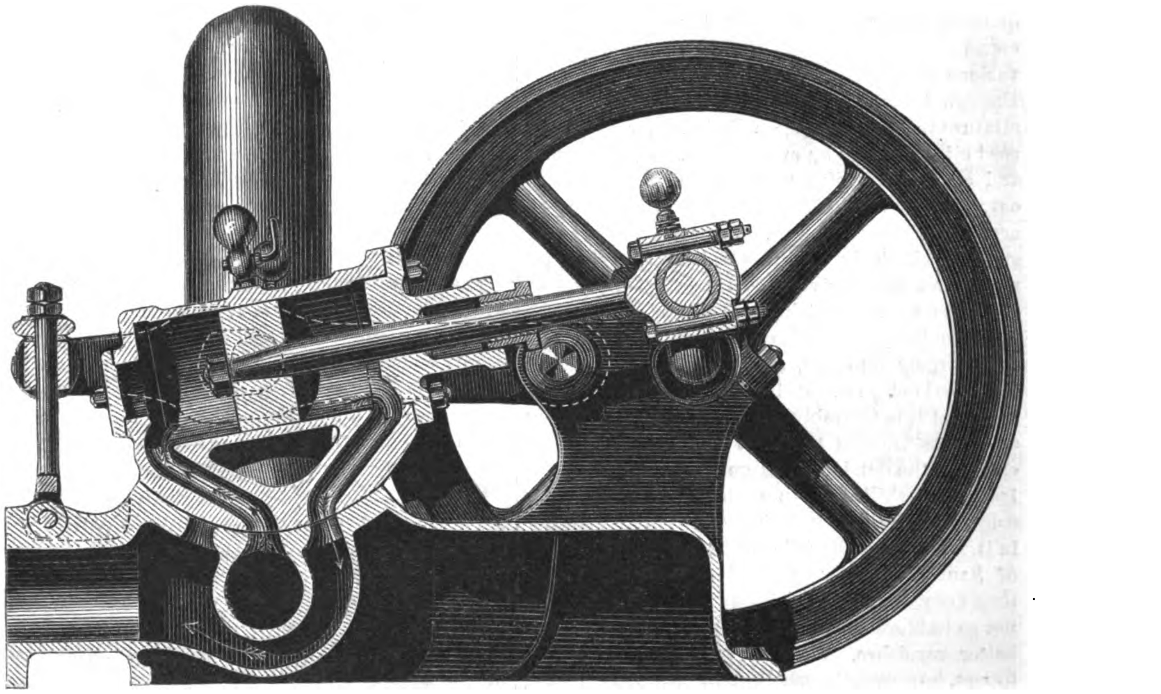
The trestle-work of a breaker at the Lackawanna coal-mine, Carbondale, Pa., about one hundred feet high, broke down on the afternoon of April 1. The timbers caught fire, and several persons were fatally injured.

Central City, Colorado, gets bitumenized wooden water-pipes, with sides, one-sixteenth of an inch thick, from Rochester, N. Y. Bitumenized paper pipes were recommended by Alderman Mechi, of London, a number of years ago.

One hundred and thirty-eight suits have been brought against the owners of the *Westfield*, of which five have been decided against them. They propose to appeal on the contemptible plea that, the explosion having occurred on Sunday, on which travel is technically illegal, they are not liable for damages.

Improved Water-pressure Engine.

Our engraving, which we take from *Engineering*, represents a very simple form of water-pressure engine, designed by Mr. A. Schmid, of Zurich, Switzerland, and which is now being manufactured in England, at the Atlas Iron-works, Gloucester. The engine shown by the illustration has a 7-inch cylinder with 9-inch stroke, and it is calculated to develop 5 effective horse-power for each 100 feet of head of water with which it is worked. It will be seen that the cylinder is oscillating, and that the face to which the passages from each end of the cylinder open is curved to an arc of a circle struck from the center line of the trunnions. This face is beneath the cylinder, and bears upon a correspondingly formed concave face, having in it three ports, of which that in the center communicates with the supply pipe, and the two outer ones with the escape or exhaust. It will be readily understood how, as the cylinder oscillates, the water is alternately admitted to and exhausted from each end of the cylinder.



IMPROVED WATER-PRESSURE ENGINE.

The trunnions on the cylinder work in bearings formed in a pair of levers, shown in dotted outline in the engraving, having their fulcra at one end on the engine frame, and connected at the other end by a cross piece as shown. A bolt—connected by a pin and double eye at its lower end to the engine frame—passes up through this cross-piece, and exerts a downward pull upon it through the intervention of an india-rubber washer. By means of the nuts on this bolt the pressure can be regulated to just the amount sufficient to keep what we may call the valve faces in water-tight contact. The trunnion bearings are also adjustable for wear as shown in the side elevation.

An air-vessel is provided on the supply pipe to absorb any shocks which would otherwise be caused by variations in the speed of flow through that pipe, and it is found that in practice these engines run with great smoothness. An engine of this class, with 5-inch stroke, has been run most satisfactorily at 200 revolutions per minute. As regards the duty obtained, Prof. Kronauer, of the Polytechnic School at Zurich, reports that, "as a member of the jury charged with the trial of twelve water motors (five cylinder engines and seven turbines) of different construction, he can state that this engine has surpassed all the others in regard of the percentage of duty and of simplicity of construction, the trials, which have been made with the greatest care and accuracy, having given a useful effect of 89 per cent." The engine is of very simple construction, and the proportions and general design seem to be excellent.

The Ramie Plant.

The ramie plant continues to enlist considerable interest in many parts of the South. It is now generally conceded that it will be a profitable crop, more than sugar, cotton, rice, or tobacco, whenever a machine is invented which will be to the ramie fiber what Whitney's saw gin was originally to the cotton fiber. A machine is all that is necessary to make it in a few years one of the most valuable crops in the South.—*Mobile Tribune.*

Manufacture of Varnish.

As commonly constituted, an oil varnish consists of some hard gum dissolved in linseed oil. This is the substance of the varnish, the two being redissolved in turpentine to afford the means of spreading them out in thin layers. As far as regards the ultimate value of the varnish, the turpentine is merely so much waste material. It may, if it be of inferior quality, injure the varnish with which it is mixed; but, however good it may be, it can do nothing to benefit or improve a varnish, which itself is in reality nothing but the mixture of various proportions of some one or more hard gums in linseed oil.

Turpentine being applied for the purpose of thinning down the body of the varnish, and that body being, when cold, almost solid, has to be added whilst the mixture of gum and oil is still hot. The heat causing an increased evaporation, and consequently a loss of turpentine, the temperature is allowed to get as low as can be consistently with a perfect and complete admixture of the spirit with the matter being secured. This is, to some extent, contrary to the old-fashioned notions, but the varnishes resulting from mixing in the turpentine at a high temperature and at a low one being identical, the loss of so much evaporated material is not now taken as an essential part of the process. We have also one less risk of fire, since the whole varnish is now removed far from any fire, and out into open air when practicable, before the turpentine is added. The quantity of turpentine required under these circumstances is much less than that stated in the various published recipes for varnish-making. Enough is commonly added to bring the whole mixture to a consistence a little stiffer than linseed oil. The loss by evaporation, whilst clearing and ageing in tanks, previous to its being sent out, gives it the amount of body which you are accustomed to see it have. The next thing to consider is the body of the varnish. Time would not permit me to give a complete description of the various gums which are or may be used.

There is one gum, however, which has come very largely into use, and that is the "kauri," New Zealand gum. It is rather dull in appearance, but it is tolerably hard, and melts at so low a temperature that the dust and chips made by cleaning the outside of large pieces can be utilized by a skillful man without the gum being colored by the carbonization of the woody matter in it. The varnish made from the better qualities of kauri have a very good gloss. When dry, they are pale in color; dry quickly; and they are not so liable to crack when exposed to the sun as better varnishes. After a few months' exposure to wet, however, the whole of the gloss disappears, and though the protecting surface remains, it becomes, through its abrasion, a harbor for the dust and dirt, and is thus rendered far from ornamental to the place of its attachment.

The temperature at which the mixture of gum and oil intended to be used melts is now recognized as forming a basis for the temperature to which the oil is to be heated previous to the introduction of the melted gum, the whole running, when the two are fairly incorporated, being also kept much under the degree of heat which was formerly considered necessary. In fact, it is in this respect that the present mode of varnish-making chiefly differs from the modes formerly employed, the greatest care being now taken to keep the temperature throughout the process as low as is consistent with perfect admixture of the several ingredients.

The next point to which attention is to be directed is the apparatus used for the modern process of varnish-making. In the first place, iron vessels generally take the place of copper ones for all common varnishes, the bottom of the gum-pots alone remaining copper, as heretofore. The lower temperature employed is found not to affect the metal, and the introduction of impurities from that source is no longer feared.

In the next place, instead of heavy copper stirrers, light thin plates at the end of the rods are used to cut the gum, etc., the greater velocity with which they can be manipulated securing more perfect mixture than of old.

In the third place, a tramway is laid down from the furnace in which the mixed gum and oil is heated, which usually runs from the shed into the open air. If, therefore, from any accident, the mixture takes fire, it can be at once removed to a place of safety, where it can be put out at more leisure.

The boiling pot, which holds about one hundred gallons, has a closely fitting conical cover, which, if it can be put on, at once extinguishes the flame if it be not too far ahead. The last improvement has only recently been introduced, and is not yet generally adopted. Two galvanized iron shafts are erected side by side; one corresponds with the gum-pot, the other with the boiling-pot; the upper end of these shafts alike communicates with the main furnace shaft. The lower ends are fitted with caps, which are so balanced by counterpoises that they can be slid up or down their respective columns. To these caps heads are attached at right angles which can be brought over, and which fit closely on to the gum-pot and boiling-pot respectively, and, when in that position, have free communication with the chimney shaft. The front of each hood is cut away and fitted with a diaphragm, slit in such a manner that the contents of the pots can be stirred, and is removable when it is desired to see into them.

The advantages of this arrangement are obvious without further description; in place of the workmen being annoyed by the dense and pungent vapors which escape from the heated gum and oil, the whole are removed, and nothing whatever comes into the air of the shed except at the time when a pot of the gum is being tilted into the boiling-pot, or when the whole has to be removed into the air. The reduction of smell, as regards the neighborhood, is so great, that in the comparatively rare intervals when a disagreeable vapor does come off, the air of the yard mixes with it sufficiently to neutralize the effect exterior to the works. Old varnish-makers, standing at the furnaces when they are in full operation, seem at first almost at a loss to know what stage of the process they are at, from the want of their accustomed choking miasma.—*The Cabinetmaker*.

THE Street Railway Company of London labors under a peculiar disadvantage, its road being regarded as a legitimate source of amusement by the boys, who use the institution as a means of exploding caps.

WANTED, A WINDMILL.—Says the New York *Evening Mail*:—"It is really singular that windmills have not been more improved upon considering their antiquity. There is unoccupied ground for some mechanical genius to gain both fortune and renown by taking the wind in hand and directing its force. Throughout the great West, where mills and other labor-saving apparatus are needed a thousandfold beyond what they possess, wind-power might be made an obedient servant."

COMMISSIONER'S DECISION.

LEVI STEVENS.—*Ex parte*.

Appeal from the Examiners-in-Chief on an application for letters-patent for an IMPROVEMENT IN THE PROCESS OF BURNING ASPHALTUM. Decided March 5, 1872.]

INVENTION DISTINGUISHED FROM DOUBLE USE.

Merely to *apply* a device to another use than the one for which it was originally intended involves no invention, and is simply *double use*; but when *adaptation* is required to secure the new result, invention is presumed, and the new organization may be patentable.

Machinery for *superheating* steam, and using it when thus superheated for liquefying asphaltum for use as a fuel, and for atomizing it in the furnace: *Held* to be patentable, notwithstanding machinery, in many respects identical, and yet requiring modifications to adapt it to the new purpose, had previously been used for spraying liquid petroleum in a furnace by means of steam at the ordinary temperature.

LEGGETT, *Commissioner*:

The alleged invention in this case is a device for using asphaltum as fuel in producing steam. It is well known that similar and, in many respects, identical mechanism has heretofore been devised for burning fluid petroleum and other liquid hydrocarbons; but the applicant seems to be the first to successfully adapt this machinery to the burning of asphaltum. Liquid petroleum can be atomized or sprayed in the furnace by wet steam, or steam at ordinary temperature; but asphaltum can be rendered fluid only by a high temperature, and then must be atomized by a jet of superheated steam. Hence, to burn asphaltum, applicant needed to add to existing machinery an arrangement for superheating the steam, and for using this superheated steam in liquefying the asphaltum, and in atomizing it when it reached the furnace. With this arrangement he has secured a new and useful result. He can economically use asphaltum as fuel in the production of steam—an end not before attained.

Clark Fisher's device for burning the common liquid petroleum, patented July 23, 1867, is not capable of burning solid petroleum or asphaltum, and hence is not a sufficient answer for applicant's device, which will do it.

To merely *apply* a device to another use than the one for which it was originally intended, involves no invention, and is simply double use, and not patentable; but when *adaptation* is required to secure the new result, invention is presumed and the new organization may be patentable. In this case the applicant has certainly done more than to merely apply Fisher's furnace to a new use. He has adapted it to superheating the steam, to liquefying asphaltum, and to spraying it in the furnace with steam superheated to a temperature that will unite with the atomized asphaltum and burn.

The decision of the Board of Appeals must therefore be reversed.

The applicant, however, has failed to describe in his specification the true state of the art, as he has entirely ignored all that Fisher has done. When he amends his application so far as to disclaim the invention described in Fisher's patent of July 23, 1867, his patent will be granted.

A RAILROAD car and fifteen hundred barrels of petroleum were burned at the refinery at Gibson's Point, Schuylkill, Pa., a few days since. The fire originated from the explosion of a still.

EMERY WHEELS.—Owing to the large and increasing demand for their emery wheels and machines, the Union Stone Company of Boston, Mass., have opened a branch office at 502 Commerce Street, Philadelphia, with Jarboe & Rogers, agents, where will be found a full assortment of their goods.

STEAM CANAL TOWAGE.

BY D. D. WILLIAMSON, MECHANICAL ENGINEER.*

The advantages to be derived by the adoption of a practical system of steam towage upon the canals of the State of New York have been too often set forth and are too obvious to need repetition. The following official figures tell the whole story :—

There are at present employed on the canals 6,870 boats, having a carrying capacity of 1,225,000 tuns, and these transport annually 6,000,000 tuns of freight. The average value of first-class boats, of which there are about 4,000, is $5,000 each, and the value of the cargo averages that of the boat. The average speed including lockage is 1½ miles per hour, and the trip from Albany to Buffalo of 350 miles is made in ten days.

The average cost of towing is 38 cents, which for the 350 miles amounts to	$133 00
Expenses of crew, interest, and depreciation in boat, etc., for ten days $12 03	120 30
Interest on cargo	9 60
Total cost of transport on per boat	$262 90

In dealing with this problem of steam towage, it is essential to recognize—

1. This immense fleet of boats must be utilized. Many plans have been proposed which require boats built upon radically different principles from the present almost universal style. No system would be acceptable which lessened the value of the twenty-odd million dollars of boats now afloat.

2. No damage must be done to the canal or the banks, neither should expensive alterations of existing works be required.

3. The present cost of transportation should be reduced at least one third, and the speed of the boats be doubled.

The rapidly declining business of the Erie Canal became so painfully apparent that a year ago the Canal Board drafted a bill asking the Legislature to vote the sum of $20,000, with which their engineers might make trials of such systems as they deemed practical. Unfortunately this bill was set aside, and in its place a loosely worded act was passed, offering a reward of $100,000 for a successful steam canal-boat, and naming a commission almost entirely without canal experience to award the same. Although this new commission have done comparatively nothing, a number of inventors have made trial of their various plans at their own expense. Notwithstanding the statement made that over 700 plans have been offered (nearly all of which are of course only on paper), it is believed that those entitled to consideration may be grouped in four systems :—

1. *The use of screw-propellers either in the bow, stern, or under the boat.*—In this group are combined the bulk of the great number of the plans offered. Every imaginable shape of propeller has been proposed, and one or two of them have been tried with considerable effect. The result of these trials, added to the countless attempts made for many years in England, have, however, confirmed the opinion of many advanced engineers, that it is a mechanical impossibility to propel a boat with good *practical* results under the peculiar conditions of the Erie Canal.

To be commercially successful, a steamboat, in addition to her own cargo, should be able to tow two first-class boats fully loaded at a speed of not less than three miles per hour. The frictional resistance in moving such a boat at the speed named is believed to be greater than the resistance which can be offered to the thrust of any form of propeller by the shallow water in which it must work. An editorial in one of our scientific journals lately stated that "the loss of power which is unavoidable in the use of any propeller working in the receding waters of a narrow and shallow channel is estimated at *eighty per cent!*" It is this loss by the "slip" of the propeller which, even if not so great as the above, is still sufficient to prevent the success of the many plans based more or less directly upon the action of a screw against the water.

The fact that the present first-class boats are built to fit as closely as possible in the locks, prevents the addition of any mechanism outside or under the boat, whilst their slight and inexpensive construction would entail constant repairs when submitted to the thrashing of the screw and the vibrations of a high-speed engine.

In the official report made within a month by D. M. Greene, Esq., the engineer appointed by the commissioners, it appears that the only steamer brought to the notice of the board was the *Dawson*, a boat specially constructed for Main's patent propeller. This boat made two round trips. On the first trip the net average running speed was 1·69 miles, and on the second trip 2·02 miles per hour, with an average expenditure of 22 horse-power. Mr. Main in a printed pamphlet claims to have made subsequently on a certain stretch of the canal a speed of 3·04 miles per hour. Mr. Greene, however, pronounces her engine power too small, and argues that an expenditure of 28 horse-power is necessary for each boat. The *Dawson* does not tow other boats, but simply carries what cargo she can in the space not occupied by the machinery and fuel.

2. *Hydraulic propulsion.*—The fact before mentioned of the size and draught of the present boats forbidding the use of propellers outside or under the hull, has led many inventors to propose taking water in at the bows and pumping it out with great force at the stern, expecting that the resistance of this jet against the water of the canal would give the required propulsion without undue agitation. Aside from the theoretical decision that the resistance of water against water cannot compare to the resistance of a screw against water (the power expended being equal), we have the practical results to confirm it in the performance of the British war-ship *Water Witch.* This ship was fitted with Ruthven's hydraulic propeller, which is the best of its class. Another ship, her exact duplicate, was fitted with a screw. The engines were of the same power in both ships, but the result of their performances was fatal to hydraulic propulsion. The latter affords special advantages to a war-ship when in action, by having no screw to foul or to be disabled by the enemy, yet its use has been abandoned. The comparison of this system with a screw would be still more adverse in the shallow water of the Erie Canal.

[*To be concluded.*]

* Paper read before the New York Society of Practical Engineering, March 13, 1872.

The Palestine survey corps have found many ancient tombs at Dagr-Tarif, oblong openings cut in the solid rock and covered by a stone slab flush with the surface. Cisterns of bee-hive form, also subterranean store-houses still used by the natives, have been discovered.

The fields in California during dry weather sometimes catch fire, and hundreds of acres are burned over, causing the loss of thousands of bushels of grain. It is proposed to divide the land by belts of alfalfa or other green forage twenty yards wide to prevent the extension of the fire over a broad area.

COMMUNICATIONS

TO CORRESPONDENTS.

We wish our readers to understand that, in freely publishing communications, we do not hold ourselves responsible for the opinions of our correspondents, inasmuch as we may occasionally publish views opposed to our own.

Messrs. Editors :—I have read with interest Prof. R. H. Thurston's letter assigning some of the causes of boiler explosions at a less steam pressure than the previous water-test indicated would be safe.

No steam user can read his letter without the reflection that, in the opinion of the best informed scientists, there are at work in his boiler hidden agencies which may at any moment culminate in disaster, and which no ordinary strength of material or faithful workmanship can overcome. These agencies cannot be attributed to steam itself, for its great elasticity and compressibility lessen the harshness of its contact with the vessel, while the additional tensile strength of the metal at the temperature of high steam increases its powers of resistance. While it is evident that he has assigned some of the immediate causes, I am persuaded that it is in another direction that we are to look for the original and remote cause, underlying all others, for the existence of the discrepancy under discussion, viz., the violation of a fundamental law governing water in contact with heated metal by the malformation of the boiler.

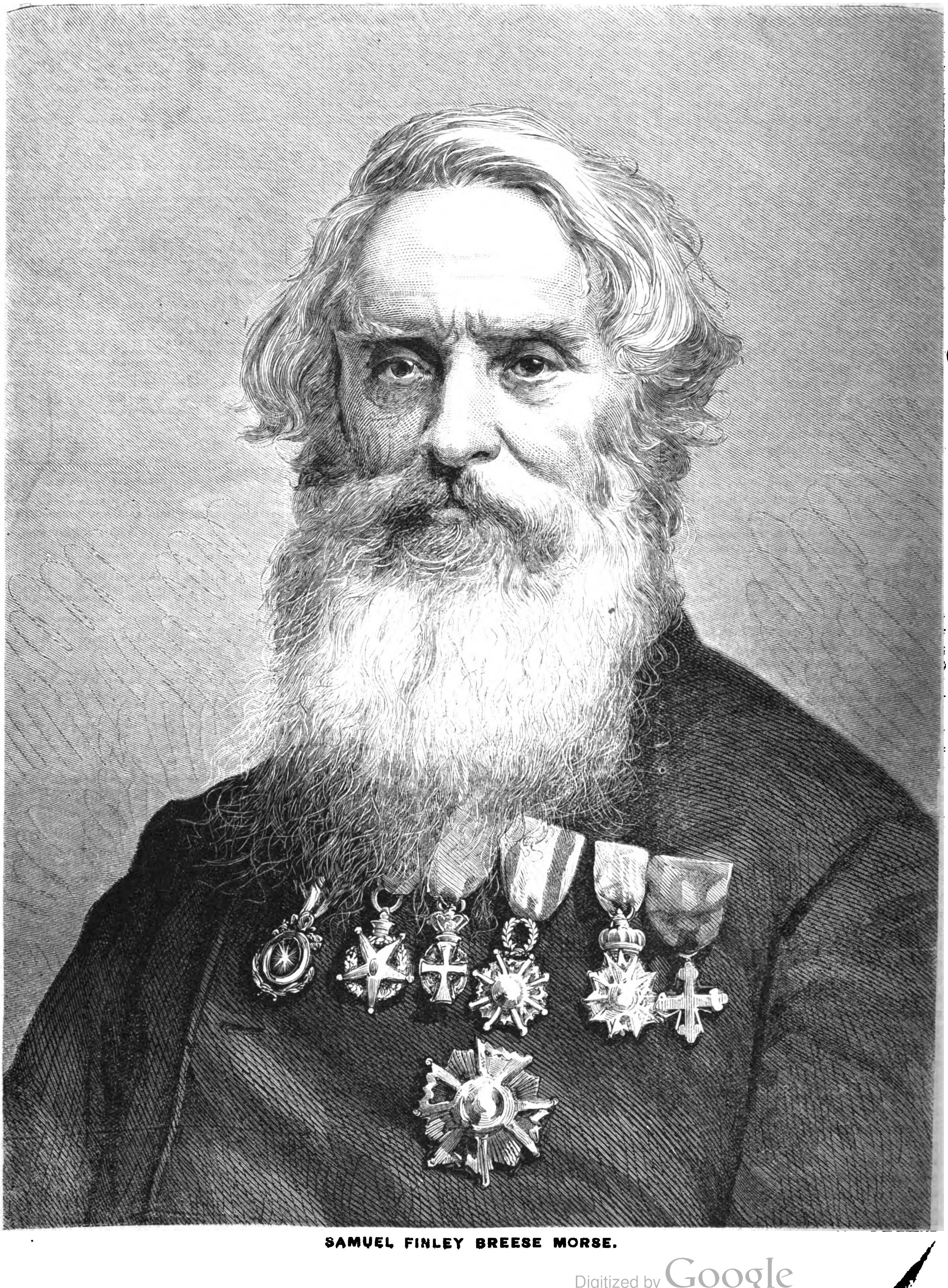
All the causes he has assigned for this discrepancy, and some he has overlooked, such as repulsion of the water from the plates, etc., etc., are but secondary, and consequential on the absence of longitudinal circulation of the water in the boiler. Local agitation or circulation confined to the diameter of the fire-box does not accomplish the object, although it is attended with advantage. Circulation must be such as to alternate with rapidity the water between the extreme ends. With this feature prominent in steam-generators, many risks disappear which were once considered unavoidable.

The largest collection of facts bearing on this subject may be found in the monthly reports of the Hartford Steam-boiler Insurance and Inspection Co., which are the more valuable as they were collected with the view of self-preservation. An analysis of these reports shows that a large proportion of defects found in boilers inspected by them would be prevented by a rapid longitudinal circulation of the water, especially as all the water can be forced through a drum so constructed as to form an eddy for the deposition of the sediment.

Increased safety and greater durability are not the only happy consequences attending this feature in steam-generators. Greater efficiency of the steam is obtained, by avoiding the priming consequent on the throw of water into the steam-pipe from the conflict between the ascending and descending columns of water in the same narrow ways.

Hoping that he may soon find leisure to treat this subject more elaborately, I remain, respectfully yours, F. A. Woodson.

243 Broadway, New York City, April 4, 1872.



SAMUEL FINLEY BREESE MORSE.

DEATH OF PROFESSOR MORSE.

WE herewith republish a portrait which appeared in our columns two or three years since of Professor S. F. B. Morse, the "Father of the Telegraph," whose death on the evening of April 2 we here sorrowfully chronicle.

Samuel Finley Breese Morse was born in Charlestown, Mass., April 27, 1791. He was the son of Jedediah Morse, D.D., author of a series of text-books on geography which for many years were standard works in the schools. Prof. Morse graduated at Yale in 1810, and afterwards went to Europe, where he studied painting under Washington Allston and Benjamin West, and also gained such proficiency in sculpture that a gold medal for a model of Hercules was awarded him by the Adelphi Society of Arts. He was the first president of the New York Academy of Design, founded in 1826. While residing abroad, he was elected to a professorship in the University of the City of New York, and while on his homeward voyage to assume the duties of this position he conceived the invention which has placed him in the foremost rank among the scientists of the world and the benefactors of humanity. This turning of his attention to the practical applications of science was, however, we are strongly disposed to believe, the result of a tendency inherent in his nature, for we recall a description given us by his brother (Sydney E. Morse, also recently deceased) of experiments made by the two when boys together in the propulsion of boats by the reaction of a stream of water on the principle of the jet propeller. The circumstances that caused this taste for applied science to develop at last in the production of one of the most important of modern improvements is thus described :—

"On board the Havre packet *Sully*, which brought him home in October, 1832, the subject formed one day a topic of conversation among the passengers. Dr. Charles S. Jackson, of Boston, described an experiment recently made in Paris, by means of which electricity had instantaneously been transmitted through a great length of wire. 'If that is so,' said Morse, 'I see no reason why messages may not be instantaneously transmitted by electricity.' Before the packet reached New York the invention of the telegraph was virtually made, and even the essential features of the electro-magnetic transmitting and recording apparatus were sketched upon paper. Of course, in reaching this result, Morse made use of the ideas and discoveries of many other minds. No great invention ever sprang complete and perfect from any one brain. Various forms of telegraphic intercourse had been devised before; electro-magnetism had been studied by savants for many years; Franklin even had experimented with the transmission of electricity through great lengths of wire. It was reserved for Morse to combine the results of many fragmentary and unsuccessful attempts, and put them, after years of trial, to a practical use; and though his claims to the invention have been many times attacked, in the press and in the courts, they have been triumphantly vindicated alike by the law and the verdict of the people, both at home and abroad. Part of the apparatus was actually constructed by Prof. Morse, in New York, before the close of the year; but it was not until 1835 that he succeeded in putting up an experimental line, consisting of half a mile of wire stretched around and around a room, and exhibiting a telegraph in actual operation. With this instrument he could send and record a message only in one direction. By 1837, he had a duplicate apparatus, and now he gave greater publicity to his scheme by an exhibition at the University. The invention attracted a great deal of interest, but very few persons could be persuaded of its financial value. At the close of the year, Prof. Morse went to Washington and asked Congress for an appropriation to build a telegraph line from Washington to Baltimore. The House Committee on Commerce, at the head of which was the Hon. F. O. J. Smith, of Maine, gave him an attentive hearing and a favorable report, but the session passed without further action, and the disappointed inventor went to England and France. He met with no encouragement in Europe, and struggled on for four years longer, renewing his appeal at Washington year after year, and still hopeful in the midst of poverty and trouble. On the last night of the session in March, 1843, he left the Capitol entirely disheartened, after patiently waiting through the long day. But the next morning, to his amazement, he learned that in the hurry and confusion of the midnight hour the expiring Congress had voted $30,000 for his experimental essay, and from this sprang the success with which, in all its colossal proportions, the world is familiar."

APPLICATIONS FOR EXTENSIONS.

OPPONENTS of extensions must file *written* objections in the Patent Office at least 20 days before the day-of-hearing; and on that day, at noon, they must appear personally, or by proxy, at the Patent Office, and state the reasons of their opposition. All testimony—*pro* or *con*—must be taken and transmitted in accordance with the official rules, which will be furnished on application. The under-named patentees have recently petitioned for extensions (for seven years) of patents granted to them in the year 1858 :—

JOHN R. MARSTON, New York City.—*Door-lock.*—Patented June 15, 1858; testimony will close on May 14, next; last day for filing arguments and examiner's report, May 24; day-of-hearing, May 29.

THEODORE SHARTS, New York City.—*Fire and Burglar Proof Safe.*—Patented June 29, 1858; testimony will close on May 28, next; last day for filing arguments and examiner's report, June 7; day-of-hearing, June 12.

HENRY H. PACKER, East Holliston, Mass.—*Hand-drill.*—Patented June 29, 1858; testimony will close on May 28, next; last day for filing arguments and examiner's report, June 7; day-of-hearing, June 12.

LOUISA R. KETCHUM, executrix of WILLIAM F. KETCHUM, deceased, Buffalo, N. Y.—*Harvester.*—Patented June 29, 1858, and re-issued July 25, 1871; testimony will close on May 28, next; last day for filing arguments and examiner's report, June 7; day-of-hearing, June 12.

BENAS COBB, Chicago, Ill.—*Railroad-car Seat and Berth.*—Patented July 6, 1858; testimony will close on June 4, next; last day for filing arguments and examiner's report, June 14; day-of-hearing, June 19.

AMOS BURNHAM, Taunton, Mass.—*Railway Bridge Signalizers.*—Patented July 6, 1858; testimony will close on June 4, next; last day for filing arguments and examiner's report, June 14; day-of-hearing, June 19.

JOHN G. PERRY, South Kingston, R. I.—*Sausage-filler.*—Patented July 6, 1858; testimony will close on June 4, next; last day for filing arguments and examiner's report, June 14; day-of-hearing, June 19.

AMASA HOUGHTON, Wauregan, Conn.—*Spinning Frame.*—Patented July 13, 1858; testimony will close on June 11, next; last day for filing arguments and examiner's report, June 21; day-of-hearing, June 26.

VARANUS SNELL, North Bridgewater, Mass.—*Heel-shaver for Boots and Shoes.*—Patented July 20, 1858; testimony will close on June 18, next; last day for filing arguments and examiner's report, June 28; day-of-hearing, July 3.

MARIETTE SMITH, administratrix of GEORGE R. SMITH, deceased, Ithaca, N. Y.—*Railway Switch.*—Patented July 20, 1858, and re-issued Dec. 17, 1867; testimony will close on June 18, next; last day for filing arguments and examiner's report, June 28; day-of-hearing, July 3.

HENRY BLANDY and FREDERICK J. L. BLANDY, Zanesville, Ohio.—*Steam-engine.*—Patented August 3, 1858; testimony will close on July 2, next; last day for filing arguments and examiner's report, July 12; day-of-hearing, July 17.

HENRY A. ROBERTS, Boston, Mass.—*Ice Stand.*—Patented August 24, 1858; testimony will close on July 23, next; last day for filing arguments and examiner's report, August 2; day-of-hearing, Aug. 7.

LEONARD BAILEY, New Britain, Conn.—*Method of securing Plane-irons to the Stocks of Bench Planes.*—Patented Aug. 31, 1858; testimony will close on July 30, next; last day for filing arguments and examiner's report, August 9; day-of-hearing, August 14.

OFFICIAL LIST OF PATENTS

ISSUED FROM THE UNITED STATES PATENT OFFICE

For the Week ending April 2, 1872,

AND EACH BEARING THAT DATE.

[*Reported officially for the "American Artisan."*]

PATENT CLAIMS, DRAWINGS, AND SPECIFICATIONS.—*Owing to the constantly increasing number of patents issued, we have—as we must have done sooner or later—ceased to publish the Claims, and instead thereof we publish the names of the patentees, with the titles of their inventions, with descriptions on another page of some of the more important inventions; but we are prepared to furnish immediately on application, or by return mail, when requested by letter, a copy of the claims of any existing patent, for - 75 cents.*
We also furnish a printed copy of the whole specification of any patent issued since November 20, 1866, for - - $1 25
We will also supply a sketch of the parts claimed in any patent, or a full copy of the drawing thereof, at charges varying from $1 upwards.

ADVICE TO INVENTORS AND PATENTEES.

Whenever asked, we will promptly send, gratis, our recently published pamphlet, entitled "IMPORTANT INFORMATION FOR INVENTORS AND PATENTEES," *containing details of the proceedings necessary to be taken by inventors desirous of obtaining Letters-Patent in the United States. Also, Instructions to Patentees concerning Re-issues, Extensions, Infringements, Foreign Patents, etc.*

Address BROWN, COOMBS & CO., *Solicitors of American and Foreign Patents*, 189 *Broadway, New York.*

125,113.—MUSIC-LEAF TURNER.—Charles I. Adkins, Pataskala, Ohio.

125,114.—LIQUID-METER.—John S. Barden, assignor of one-half his right to Albert F. Allen, Providence, R. I.

125,115.—PARALLEL RULER.—Theodore Bergner, assignor to James W. Queen & Co., Philadelphia, Pa.

125,116.—NECKTIE HOLDER.—Alonzo F. Bixby, Decatur, Ill.

125,117.—WROUGHT-IRON BRIDGE.—Alfred P. Boller, Orange, N. J.

125,118.—COVER AND TRAP FOR SEWER-BASINS.—William H. Chase and George White, Washington, D. C.

125,119.—COMBINED BRAKE AND STARTER.—Joseph A. Cody, New York City.

125,120.—HOG-TRAP.—Jeremiah J. Cox, Woodhull, Ill.

125,121.—MACHINE FOR PUNCHING METALS.—Edward Craddock, London, England, assignor to George Augustus Thomson, Uniontown, Pa.

125,122.—MANUFACTURE OF IMITATION MARBLES.—George Davey, London, England.

125,123.—MORTISING MACHINE.—Edwin Dayton, Meriden, Conn.

125,124.—KNIFE-SCOURING BOARD.—Edgar Deming, Seneca Falls, N. Y.

125,125.—COMPOSITION FOR THE MANUFACTURE OF DRAIN-PIPES, TILE, ETC.—Charles J. Eames, New York City.

125,126.—TOY WAGON.—Henry W. Eastman, Baltimore, Md.

125,127.—BREECH-LOADING FIREARM.—William H. Elliot, New York City.

125,128.—ARCH FOR BRIDGES.—Daniel Forargue, Cleveland, Ohio.

125,129.—CLOTHES-WRINGER.—Albert H. Goss, Auburn, N. Y.

125,130.—MACHINE FOR BENDING WOOD.—Oliver W. Griffiths, Charlestown, Mass.

125,131.—ICE PLOW.—George B. Gruman, Ridgefield, Conn.

125,132.—PISTON-PACKING.—Abraham W. Harris, Providence, R. I.

125,133.—LUBRICATING-OIL CUP.—Aaron Higley, Cleveland, Ohio.

125,134.—COVERING OF WHIPS.—David Holmes, Westfield, Mass.

125,135.—HIDE AND FULLING MILL.—Sylvanus Hussey, assignor to himself and Sellen, Adams & Co., Gowanda, N. Y.

125,136.—LINE AND STRAP HOLDER.—Frank W. Jay, Canton, Ohio.

125,137.—CUTTING-TOOL FOR THE MANUFACTURE OF CRACKLINGS FROM ROASTED PORK.—Louis F. Lannay, Baltimore, Md.

125,138.—HOT-BLAST OVEN.—Richard Long, Pittsburg, Pa. Ante-dated March 16, 1872.

125,139.—COOLER FOR SODA-WATER AND OTHER LIQUIDS.—John Matthews, New York City. Ante-dated March 16, 1872.

125,140.—GENERATING AND UTILIZING STEAM AND THE PRODUCTS OF COMBUSTION.—Thomas McDonough, New York City.

125,141.—STEAM-HEATING APPARATUS FOR PREVENTING THE ACCUMULATION OF SNOW AND ICE UPON RAILWAYS AND STREETS.—Rutger B. Miller, Utica, N. Y.

125,142.—POULTRY-COOP.—Mark Potter, Girard, Pa.

125,143.—FURNACE FOR SMELTING, FUSING, AND ROASTING ORES.—John M. Reid, assignor of two-thirds his right to M. Riddell and H. McDonald, Alleghany City, Pa. Ante-dated Feb. 12, 1872.

125,144.—MANUFACTURE OF BRICKS, TILES, ETC.—John M. Reid, assignor of two-thirds his right to M. Riddell and H. McDonald, Pittsburg, Pa.

125,145.—APPARATUS FOR FINISHING TUMBLERS.—Daniel C. Ripley, Pittsburg, Pa.

125,146.—FRUIT-PACKING IMPLEMENT.—Charles C. Roberts, Perrysburg, Ohio.

125,147.—FURNACE FOR MELTING IRON.—George H. Sellers, Wilmington, Del.

125,148.—BOILER-FURNACE.—Benjamin F. Smith, New Orleans, La. Ante-dated March 13, 1872.

125,149.—MACHINE FOR SLITTING MATCHES.—Manasseh Smith and James C. Jordan, Portland, Maine.

125,150.—HUNTING-LAMP.—James T. Staples, Bladon Springs, Ala.

125,151.—ELECTRO-MAGNET.—Isaac P. Tice, New York City. Ante-dated March 15, 1872.

125,152.—Liquid-meter.—Isaac P. Tice, New York City.

125,153.—Process and Apparatus for the Manufacture of Sulphate of Lead.—H. Augustus Whiting, San Francisco, Cal.

125,154.—Constructing Links for Valve-gear for Steam-engines.—Joseph A. Wildman, Chicago, Ill.

125,155.—Steam-cooking Apparatus.—Levi K. Williams, Hudson, Mich.

125,156.—Earth-closet.—Robert S. Williams, Norristown, Pa.

125,157.—Millstone-dress.—Pierce W. Yarrell, Garysburg, N. C.

125,158.—Frictional Brake.—Pierce W. Yarrell, Garysburg, N. C.

125,159.—Machine for grinding Clay, etc.—Abram Alexander, assignor to himself, Joseph A. Robinson, and James Ewing, Pittsburg, Pa. Ante-dated March 26, 1872.

125,160.—Rock and Ore Crushing Roll.—Abram Alexander, assignor to himself, Joseph A. Robinson, and James Ewing, Pittsburg, Pa. Ante-dated March 26, 1872.

125,161.—Sash-holder.—William W. Amos, Olathe, Kan.

125,162.—Machine for clarifying, mixing, and bleaching Lard.—Oscar J. Backus, San Francisco, Cal.

125,163.—Fireproof Building.—Joseph J. Bartlett, New York City.

125,164.—Hub for Carriage-wheels.—Isaac E. Bower, Bainbridge, Ga.

125,165.—Glass-blower's Mold.—Samuel R. Bowie, New Bedford, Mass.

125,166.—Gas-engine.—George B. Brayton, Boston, Mass.

125,167.—Ditching Machine.—Henry Carter, Aylmer, Canada.

125,168.—Combined Latch and Lock for Sliding-doors.—Charles W. Chappel, Watertown, Wis.

125,169.—Grain-bin.—Lewis S. Chichester, assignor to Charles F. Chichester, Brooklyn, N. Y.

125,170.—Preparing Grain for Grinding.—Lewis S. Chichester, New York City, assignor to Charles F. Chichester, Brooklyn, N. Y.

125,171.—Grain Scourer and Huller.—Lewis S. Chichester, assignor to Charles F. Chichester, Brooklyn, N. Y.

125,172.—Scouring and Hulling Machine.—Lewis S. Chichester, assignor to Charles F. Chichester, Brooklyn, N. Y.

125,173.—Medical Compound or Capsicum Plasters.—James Coddington and Isaac Coddington, New York City.

125,174.—Throttle-valve Stand and Stem.—John W. Compant and Engelbert Krauskopf, Fredericksburg, Tex.

125,175.—Manufacture of Hose and Tubing for Water, Steam, and other Fluids.—Sydney P. Cook, San Francisco, Cal.

125,176.—Treadle for Sewing-machines.—Frederick Hobbs Coombs, Bangor, Me.

125,177.—Piston-packing for Printing-presses.—Calvert B. Cottrell, Westerly, R. I.

125,178.—Stamping and Hammering Machine.—George D. Crocker, Virginia City, Nev.

125,179.—Counting-register for Locomotives.—Edward P. Curtiss, Cleveland, Ohio.

125,180.—Permutation Lock.—George L. Damon, Boston, Mass.

125,181.—Machine for Compressing Puddlers' Balls.—James Dangerfield, New Albany, Ind.

125,182.—Bridge.—John H. Diedrichs, Richmond, Va.

125,183.—Hay-carrier.—James B. Drake, Indianapolis, Ind.

125,184.—Washing Machine.—John Eckerson, Spring Valley, N. Y.

125,185.—Plow.—Samuel A. Fanning, Jacksonville, Ill.

125,186.—Device for molding Dovetails.—Amon L. Finch, Sing Sing, N. Y.

125,187.—Demijohn.—George W. Foster and Charles W. Foster, Charlestown, Mass.

125,188.—Knapsack Attachment.—James S. Foy, assignor to Wilson & Stellwagen, Philadelphia, Pa.

125,189.—Fence-post.—Augustus M. Freeman, Charles P. Idell, and Bergen Vanderhoven, Metuchen, N. J.

125,190.—Washing Machine.—Joseph C. Grannan, assignor of one-half his right to Wm. A. Bitner, Cincinnati, Ohio.

125,191.—Spring for Railway-car Buffers.—John Haldeman, West Point, Va.

125,192.—Washing Machine.—Grove M. Hall and Lawrence White, Orford, Iowa.

125,193.—Cleaning and purifying Beer-barrels.—William Harvey, Waterville, assignor of one-half his right to Samuel Finn, Utica, N. Y.

125,194.—Carbureter.—Horace Holton, St. Louis, Mo.

125,195.—Folding-chair.—Henry James, North Adams, Mass.

125,196.—Nail-plate Nipper.—George B. Johnson, assignor to Dennis D. McCoy, Wheeling, W. Va.

125,197.—Grape Crusher and Stemmer.—George Johnston, Sacramento, and William F. Johnson, Folsom, Cal.

125,198.—Divider Attachment for Harvesters.—John H. Keller, Boalsburg, and Daniel F. Luse, Center Hall, Pa.

125,199.—Earth-scraper.—Michael Kelly, Fairfield, Vt.

125,200.—Blacking-brush, etc.—Hugh S. Kerr, Philadelphia, Pa.

125,201.—Treadle for Sewing-machines.—Rufus Leavitt Bridgeport, Conn.

125,202.—Guide-slide for Camera-boxes.—Otto Loehr, New York City. Ante-dated March 19, 1872.

125,203.—Extension Lathe Carrier.—William A. Lorenz, Newark, N. J.

125,204.—Stencil Plate.—John McCullagh, New York City.

125,205.—Device for propelling Canal-boats.—Thomas K. McDonell, San Francisco, Cal.

125,206.—Carriage-wheel.—Charles A. Miller, Urbana, Ohio.

125,207.—Propelling Canal-boats.—Wilson P. More, Moresville, N. Y.

125,208.—Dough-board.—Harris F. Morse, assignor to himself and Charles Trefethen, Manchester, N. H.

125,209.—Clipping Machine.—James W. Moyer, Cooperstown, N. Y.

125,210.—Rope-railway.—Julius Hermann Müller, Vienna, Austria, assignor to Francis Felbinger, Pittsburg, Pa.

125,211.—Washing Machine.—Mrs Sarah Mundy (administratrix of James H. Mundy, deceased) and Robert P. McConaughy, Washington, Iowa.

125,212.—Manufacture of Iron from Mill-cinder.—Charles Motier Nes, York, Pa.

125,213.—Fastening for Belts.—Harry Norfolk, assignor of one-half his right to Jacob B. Frank, Vicksburg, Miss.

125,214.—Heel for Boots and Shoes.—Charles B. Norton, Crittenden, N. Y.

125,215.—Sawing Machine.—Safaryne W. Nyce, Blooming Grove, Pa.

125,216.—Horse Hay-rake.—Linus A. Paddock, Pecatonica, Ill

125,217.—Corn-sheller.—Asahel H. Patch, Hamilton, Mass.

125,218.—Water-closet.—Charles Perkes, assignor to himself and Thomas Jefferson Close, Philadelphia, Pa.

125,219.—Gaiter.—William E. Putnam, assignor to W. E. Putnam & Co., Boston, Mass.

125,220.—Device for closing the Mouths of Casks.—John F. C. Rider, South Newmarket, N. H. Ante-dated March 26, 1872.

125,221.—Pipe-tongs.—James E. Roache, New York City.

125,222.—Gig-saddle Hook.—William Sassaman, Hightstown, N. J.

125,223.—Lock for Valises, etc.—Reinhard Schmitt, Newark, N. J.

125,224.—Propelling Street-cars.—Joseph L. Simms and William T. Duvall, Georgetown, D. C.

125,225.—Vegetable-p er.—Marshall P. Smith, Baltimore, Md.

125,226.—Locking-washer.—Hiram C. Stouffer, East Lewistown, Ohio.

125,227.—Clothes-drier.—Anson C. Stowe, San José, Cal. Ante-dated March 21, 1872.

125,228.—Rubber Cover for Flat-belt Pulleys.—John W. Sutton, Akron, Ohio.

125,229.—Breech-loading Firearm.—John F. Thomas, Ilion, N. Y.

125,230.—Ruffling Attachment for Sewing-machines.—Edwin J. Toof, Fort Madison, Iowa.

125,231.—Ruffling Attachment for Sewing-machines.—Edwin J. Toof, Fort Madison, Iowa.

125,232.—Combined Propeller and Fire-extinguisher.—Allen Turner, Bronson, Mich.

125,233.—Mattress-stuffer.—Thomas A. Watson, assignor to himself and A. H. Phillips, Brenham, Tex.

125,234.—Glass-mold.—Frederic A. Weise, Baltimore, Md., assignor to himself and John H. King, Washington, D. C.

125,235.—Carriage-step.—Edward Wells, New Haven, Conn.

125,236.—Hinge for Carriage-door.—Edward Wells, New Haven, Conn.

125,237.—Tug-clip.—John B. Welpton, Tabor, Iowa.

125,238.—Thrashing Machine.—Seth Wheeler, Albany, N. Y.

125,239.—Making Pivot-holes in Keys of Musical Instruments.—Salmon H. Wilder, assignor to William A. Reed, Deep River, Conn.

125,240.—Machine for cleaning and finishing Carpets.—John Wilkinson, Jun., Leeds, England.

125,241.—Coffee-roaster.—Benjamin I. Williams, Lansing, Mich.

125,242.—Billiard-register.—Frank M. Wood and George Geer, Galesburg, Ill.

125,243.—Pump.—Samuel M. Young and Philipp Brand, Jacksonville, Ill.

125,244.—Bridge.—John Zellweger, Louisville, Ky.

125,245.—Manufacture of Iron.—John Absterdam, New York City.

125,246.—Hair for stuffing Cushions, etc.—William Adamson, Philadelphia, Pa.

125,247.—Treating Vegetables for Food.—William Adamson and Charles F. A. Simonin, assignors to the said Adamson, Philadelphia, Pa.

125,248.—Preserving Meat for Food.—William Adamson and Charles F. A. Simonin, assignors to the said Adamson, Philadelphia, Pa.

125,249.—Extracting Sugar from Sweet Potatoes and other Vegetable Substances.—William Adamson and Charles F. A. Simonin, assignors to the said Adamson, Philadelphia, Pa.

125,250.—Spring Bed-bottom.—Sidney B. Andrews, Chicago, Ill.

125,251.—Process for preparing Wood for Roofing, etc.—Thurman Bailey, Bridport, Vt.

125,252.—Shipping Apparatus.—Cyrus W. Baldwin, assignor to American Boot and Shoe Machine-works, Boston, Mass.

125,253.—Clothes-pin.—Thomas C. Ball, Bellow's Falls, Vt.

125,254.—Manufacture of Artificial Stone.—Charles J. Bandman, Union, N. J.

125,255.—Brick Machine.—Herman C. Bankerd, Morgantown, West Va.

125,256.—Stop Motion for Elevators.—Henry E. Bathrick, Boston, Mass.

125,257.—Manufacture of Sheet-metal Screw rings.—Lewis F. Betts, Philadelphia, Pa.

125,258.—Whip-socket.—Winfield Bloodgood, New York City.

125,259.—Hot-air Furnace.—William H. Bond, Syracuse, N. Y.

125,260.—Apparatus for treating Animal Matters for Fertilizers.—William L. Bradley, Boston, Mass.

125,261.—Compound for Paint and Putty.—Revere M. Breinig, Brooklyn, N. Y.

125,262.—Sash-holder.—William Hammond Brown, Bangor, Maine.

125,263.—Machine for dressing Stone.—John Dickinson Brunton, Leighton Crescent, Kentish Town, England.

125,264.—Mowing Machine.—Orrin H. Burdick and Oscar F. Daggett, assignors to Orrin H. Burdick and David M. Osborne, Auburn, N. Y.

125,265.—Soap.—John Burke, assignor to himself and David Reed, Sullivan, Ind.

125,266.—Car-roof.—John L Burnham, Nashville, Tenn.

125,267.—Stereopticon Apparatus.—Albert G. Buzby, assignor to W. Mitchell McAllister, Philadelphia, Pa.

125,268.—Cooler for Liquids.—John W. Campbell, Sen., New York City.

125,269.—Machine for threading Wood-screws.—James M. Carpenter, Pawtucket, R. I.

125,270.—Sewing-machine for Fringing.—Philena Casselberry, Peoria, Ill.

125,271.—Cultivator.—Isaac H. Chappell, Lawrence, Kan.

125,272.—Brick Machine.—Charles Clark, Connellsville, Pa.

125,273.—Velocipede.—John C. Cline, assignor to himself and John A. Seeds, Philadelphia, Pa.

125,274.—Guard for Boot-straps.—John E. Curtis, Marlborough, Mass.

125,275.—Fire-extinguisher.—James Duffy, Quincy, Ill.

125,276.—Hide and Leather Working Machine.—Edward Fitzhenry, Somerville, Mass.

125,277.—Tobacco-curing Apparatus.—Charles W. Flippen, Laurel Grove, Va.

125,278.—Hame for Harness.—David Foreman, Milton, Ill.

125,279.—Handle for Brushes.—Stephen D. Foster, Portland, Maine.

125,280.—Gang-plow.—Andrew Freeman, Homer, Ill.

125,281.—Hinge for Table-leaves.—David A. Garver, Bryan Ohio.

125,282.—Dovetailing Machine.—Alonzo S. Gear, Boston, Mass., and Ben F. Dunklee, Concord, N. H., assignors to said Alonzo S. Gear.

125,283.—Treadle for Sewing-machines.—William H. Elliot New York City.

125,284.—Concrete Pavement.—William Gilbert, Detroit Mich.

125,285.—Preserving Meat, etc.—William A. Gillespie, Louisa Court House, Va., assignor of one-half interest to James W. Flanagan, Texas.

125,286.—Medical Compound.—Friedrick Goetsch, Bloomington, Ill.

125,287.—Spark-arrester.—William F. Grassler, Muncy, Pa.

125,288.—Construction of Bird-cages.—Gottlob Günther New York City.

125,289.—Machine for ironing and polishing Cloth, etc.—Hugh Hamill, New York City.

125,290.—Animal-trap.—Benjamin Harnish, Lancaster, and David H. Harnish, Pequea, Pa.

125,291.—Fountain-pen.—George F. Hawkes, New York City.

125,292.—Brick-kiln.—Benjamin R. Hawley, Normal, Ill., assignor to Alonzo R. Morgan, New York City.

125,293.—Burglar-alarm.—Isaac Herzberg and Abraham Herzberg, Philadelphia, Pa.

125,294.—Metallic Plate for Roofing.—Thomas N. Hickcox, Brooklyn, N. Y.

125,295.—Mortar Mill.—Henry Hill, Chicago, Ill.

125,296.—Burglar-alarm.—Thomas N. Howell, Circleville, Ohio.

125,297.—Metal-coated Sad-iron.—William H. Howell, Geneva, Ill.

125,298.—Car-coupling.—Frank M. Hunt, Marshallville, Ga.

125,299.—Shoe.—John H. Hurd, Dover, N. H.

125,300.—Process and Apparatus for separating Fats and Oils from Seeds, Grains, etc.—Elias Smith Hutchinson, Baltimore, Md.

125,301.—Sewing or Embroidering Machine.—Albert W. Johnson, assignor to Charles B. Hendricks, New Haven, Conn.

125,302.—Device for securing Punches to their Stocks.—John Johnson, New York City.

125,303.—Potato-digger.—Moses Johnson, assignor of one-half his right to Charles A. Esslinger, Three Rivers, Mich.

125,304.—Tramway for Turnpikes.—John M. Johnston, Mt. Vernon, Mich.

125,305.—Reversible Necktie or Scarf.—Louis Kahn, New York City.

125,306.—Hand Corn-planter.—Arthur C. Kent, Janesville, Wis.

125,307.—Dumping-car.—Sidney D. King, Middletown, N. Y.

125,308.—Harvester-rake.—William A. Kirby, assignor to himself and David M. Osborne, Auburn, N. Y.

125,309.—Device for Locking-nuts.—Thomas W. Kirkwood, McKeesport, Pa.

125,310.—Railway Rail-chair.—Davie Loomis and Elias Rhodes, Jun., Clyde, Ohio; said Rhodes, Jun., assignor to said Lumis.

125,311.—Clothes-pin.—Simeon Benedict Lucas, Hindsdale, N. Y.

125,312.—Manufacture of Artificial Stone from Blast-furnace Cinder.—Fritz Lürmann Georgsmarienhütte, near Osnabrück, Prussia.

125,313.—Wind-wheel.—Giles Mabie and Thomas C. Little, said Mabie assigns his right to Thomas C. Little & Co., Dixon, Ill.

125,314.—Grain-drill.—Phineas P. Mast and Charles O. Gardiner, assignor to P. P. Mast & Co., Springfield, Ohio.

125,315.—Buckle.—Charles Maxwell and John G. Linder, Syracuse, N. Y.

125,316.—Voting Apparatus.—Hugh T. McAlister, McAlisterville, Pa.

125,317.—Machine for bending Sheet-metal.—Robert B. McConnell, Evansville, Ind.

125,318.—Combined Corn Harvester and Husker.—John McLeish, Chicago, Ill., assignor to William H. Richardson, Philadelphia, Pa.

125,319.—Combined Cloth, Cord, and Paper Cutter.—Isaac B. Millner, Watkins, N. Y.

125,320.—Sash-holder.—Gideon F. Moore, Wilmington, Ohio.

125,321.—Securing Steam-boiler Tubes in Tube-sheets.—Walter Moorhouse, assignor to himself, William Moorhouse, and Joseph Field, Philadelphia, Pa.

125,322.—Sink-strainer.—Jordan L. Mott, Mott Haven, N. Y.

125,323.—Refrigerator.—Philip Nunan, Sandusky, Ohio.

125,324.—Seed-sower.—Seth White Paine, Rochester, N. Y.

125,325.—Spike-drawer.—Peter C. Parkinson, Marquette, Mich.

132,326.—Fly-paper.—Thaddeus E. Peck, assignor to himself and L. F. Curtis, Bridgeport, Conn.

125,327.—Gas-burner.—Samuel W. Pingree, Lawrence, Mass.

125,328.—Alarm-bell.—William M. Preston, assignor to himself and Jesse A. Secoy, Roxbury, N. Y.

125,329.—Portable Show-seats.—David C. Price, St. Paul, Minn.

125,330.—Horse Hay-fork.—Andrew Ream and Charles L. Bush, Reading, Pa.

125,331.—Manufacture of Water-proof Hose.—Thomas L. Reed, Providence, R. I.

125,332.—Method of forcing Plants.—Charles Reese, Baltimore, Md.

125,333.—Ice-cream Holder and Filler.—Henry R. Robbins, Baltimore, Md.

125,334.—Trunk-lid Supporter.—Clementine D. Rutherford, Brooklyn, N. Y.

125,335.—Buckle.—Henry Sanders, Utica, N. Y. Ante-dated March 19, 1872.

125,336.—Compound Implement.—John C. Schlarbaum, San José, Cal.

125,337.—Device for removing obstacles from the Throats of Cattle.—Christian Schulc, North East, assignor of one-half his right to Michael Weber, Erie, Pa.

125,338.—Pea-nut Thrasher and Gin.—Edwin G. Scott, Waverly, Va.

125,339.—Ear-muff.—Charles Sedgwick, New York City.

125,340.—Cutter-head.—Archibald D. Sherer, Baltimore, Md

125,341.—TIRE FOR CARRIAGE-WHEELS.—Henry Silvester, St. Louis, Mo.

125,342.—BEDSTEAD-FASTENING.—Joseph Simpson, Newark, Ohio.

125,343.—APPARATUS FOR PULVERIZING ANIMAL MATTERS FOR FERTILIZERS.—Amor Smith, Cincinnati, Ohio.

125,344.—DRIER.—Marshall P. Smith, Baltimore, Md.

125,345.—BRANCH-COUPLING FOR CEMENT PIPES.—Melvin Stephens, Brooklyn, N. Y.

125,346.—STREET-SPRINKLER.—Henry G. Stiebel, Cincinnati, Ohio.

125,347.—COOKING-STOVE.—David Stuart, Philadelphia, Pa.

125,348.—COAL-SIFTER.—Stephen W. Stuart, Richmond, Maine.

125,349.—MANUFACTURE OF SPIKES.—James H. Swett, Pittsburg, Pa.

125,350.—SWIVELED CHAIR.—Daniel E. Teal, New Lisbon, N. Y.

125,351.—DREDGING MACHINE.—William T. Thelin, Baltimore, Md.

125,352.—MARINE CAMEL.—Morton Toulmin, New Orleans, La. Ante-dated March 23, 1872.

125,353.—BREAST-COLLAR FOR HORSES.—Garrett Van Wagenen, Pittsburg, Pa.

125,354.—HINGE.—William Wakenshaw, Newark, N. J.

125,355.—APPARATUS FOR DRILLING WELLS.—Fred S. Ward and Emmett Cooper, Theresa, N. Y.

125,356.—WOODEN LAMBREQUIN.—Henry Weber, Detroit, Mich

125,357.—SPRING-BED.—Isaac K. Webster, assignor to himself and John F. Fornes, Buffalo, N. Y.

125,358.—CENTRIFUGAL SUGAR MACHINE.—Ludwig Weinrich, Berlin, Prussia.

125,359.—HOLDER AND ADJUSTER FOR LEAD-PENCILS, ETC.—Edward Weissenborn, Hudson City, N. J.

125,360.—MACHINE FOR COLORING AND POLISHING LEAD-PENCILS, ETC.—Edward Weissenborn, Hudson City, N. J.

125,361.—MACHINE FOR FORMING LEAD AND OTHER PENCILS.—Edward Weissenborn, Hudson City, N. J.

125,362.—MACHINE FOR VARNISHING OR COLORING LEAD-PENCILS, ETC.—Edward Weissenborn, Hudson City, N. J.

125,363.—SELF-CLOSING VALVE AND FAUCET.—Darius Wellington, Boston, Mass. Ante-dated March 30, 1872.

125,364.—CAR-SEAT.—Nelson S. Whipple, Detroit, Mich.

125,365.—STATIONARY WASH-BASIN.—Thomas S. White, Grand Haven, Mich.

125,366.—GRAIN-BINDER.—John H. Whitney, Rochester, Minn.

125,367.—COOKING-STOVE.—Archibald Wieting, assignor to Elizabeth Wieting, Fort Plain, N. Y.

125,368.—RAILWAY RAIL.—Eugene Wiley, Philadelphia, Pa., assignor of one-third his right to George P. Fisher and Charles G. Fisher, Washington, D. C.

125,369.—CARPET-SWEEPER.—Freeman O. Willey and Daniel B. McEnery, La Fayette, Ind.

125,370.—EARTH-CLOSET.—Robert S. Williams, Norristown, Pa.

125,371.—VALVE FOR ICE MACHINES.—Franz Windhausen, Brunswick, Germany.

125,372.—APPARATUS FOR TRACING DRAWINGS, ETC.—Casper Zweifel and Edward Stevens, Pomeroy, Ohio.

125,373.—ROTARY STEAM-ENGINE.—Samuel Gibson, York, Pa.

RE-ISSUES.

4,839.—HORSE-POWER.—Joseph H. Kleppinger, Cherryville, Pa. Patent No. 79,074, dated June 23, 1868.

4,840.—SEWING-MACHINE.—Hiram Plummer, Brooklyn, N. Y. Patent No. 79,856, dated July 14, 1868.

4,841.—SNUFFER.—Orson W. Stow and Augustus Barnes, assignors to the Peck, Stow & Wilcox Co., Southington, Conn. Patent No. 18,713, dated Nov. 24, 1857; extended seven years.

4,842.—BREECH-LOADING FIREARM.—Stephen W. Wood, Cornwall, N. Y. Patent No 34,854, dated April 1, 1862.

4,843.—CARTRIDGE-SHELL.—(Div. B.)—Stephen W. Wood, Cornwall, N. Y. Patent No. 34,854, dated April 1, 1862.

4,844.—CLOTHES-WRINGER.—A. M. Bailey and John O. Couch, assignors to Metropolitan Washing Machine Company, Middlefield, Conn. Patent No. 34,178, dated Jan. 14, 1862; re-issue No. 3,735, dated Nov. 30, 1869.

4,845.—ROOFING COMPOSITION.—David G. Conger, Chicago, Ill. Patent No. 124,117, dated Feb. 27, 1872.

4,846.—RAILWAY-CAR PLATFORM.—Rensselaer A. Cowell, Cleveland, Ohio. Patent No. 110,901, dated Jan. 10, 1871.

4,847.—STEAM-TRAP.—George Doyle, assignee of John Avery, Jun., Barre, Mass. Patent No. 27,769, dated April 10, 1860.

4,848.—BRICK-KILN.—Benjamin R. Hawley, Normal, Ill., assignor to Alonzo R. Morgan, New York City. Patent No. 118,364, dated Aug. 22, 1871.

4,849.—STEAM-ENGINE VALVE.—Samuel J. Peet, assignor, by mesne-assignments, to the Peet Valve Company, Boston, Mass. Patent No. 60,932, dated Jan. 1, 1867.

4,850.—FARE-BOX.—John B. Slawson, New York City. Patent No. 57,000, dated Aug. 7, 1866.

4,851.—STEAM AND HYDRAULIC PRESS.—John F. Taylor, Charleston, S. C. Patent No. 112,298, dated Feb. 28, 1871.

4,852.—STOP-VALVE FOR PETROLEUM PACKAGES.—Albin Warth, Stapleton, N. Y. Patent No. 102,187, dated April 19, 1870.

DESIGNS.

5,734.—SUMMER FRONT FOR A FIREPLACE GRATE.—John Bryant, San Francisco, Cal.

5,735.—RADIATOR FOR A STEAM-HEATER.—Lewis S. Daniels, Foxborough, Mass.

5,736.—SHAWL.—Joseph Hodgson, assignor to Thomas Dolan, Philadelphia, Pa.

5,737.—HYDRANT.—Charles Seltman, assignor to Somerville & Leitch, Washington, D. C.

5,738.—BEER-MUG.—Charles Ballinger, Wilkins Township, assignor to McKee Brothers, Pittsburg, Pa.

5,739 to 5,741.—TYPE.—Henry Brehmer, Brooklyn, N. Y., assignor to William Crawford Conner, New York City.

5,742.—ORNAMENTATION OF GLASSWARE.—John Bryce, Allegheny County, Pa.

5,743.—FENCE.—Francis A. Fleming, Curwinsville, Pa.

5,744.—BEER-MUG.—John H. Hobbs, Wheeling, W. Va.

5,745.—LABEL.—Thomas K. Leslie, New York City.

5,746.—FLOOR OIL-CLOTH PATTERN.—Jeremiah Meyer, assignor to D. Powers & Sons, Lansingburg, N. Y.

5,747.—FLOOR OIL-CLOTH PATTERN.—Victor E. Meyer, Lyon's Farms, Elizabeth, N. J., assignor to Deborah Powers, Albert E. Powers, and Nathaniel B. Powers, Lansingburg, N. Y.

5,748.—CARPET-PATTERN.—Foster Nowell, assignor to the Pine Valley Company, Milford, N. H.

5,749 and 5,750.—HEATING-STOVE.—Watson Sanford, New York City.

5,751.—BOW.—John O. Wallace, Cincinnati, Ohio.

TRADE-MARKS.

722.—LANTERN.—Chicago Manufacturing Company, Chicago, Ill.

723.—SPIRITUOUS LIQUORS AND WINES.—Clarke & Schultz, New York City.

724.—SPOOL-COTTON.—J. & P Coats, Paisley, Scotland.

725.—OYSTERS, FISH, ETC.—S. H. Davis & Co., Detroit, Mich.

726.—TOILET PREPARATION.—Samuel S. Fitch & Son, New York City.

727.—VARNISH, OIL, AND NAPHTHA.—Forest City Varnish, Oil, and Naphtha Company, Cleveland, Ohio.

728.—MEDICINE.—Samuel Gilliland, Pittsburg, Pa.

729.—METAL TOOLS, IMPLEMENTS, ETC.—G. W. Hallett & Company, West Meriden, Conn.

730.—JEWELRY.—Joslin, Palmer & Williams, Leominster, Mass.

731.—COPYING-PRESS.—Arthur Le Clercq, New York City.

732 and 733.—BADGES, METALS, SHIRT-STUDS, ETC.—Horace Taplin, Lowell, Mass.

734.—BLANK-BOOKS.—J. E. Tilton & Co., Boston, Mass.

735.—CLOTHING.—Willoughby, Hill & Co., Boston, Mass., and Chicago, Ill.

736.—LAMP-OIL.—Sharp & Craig, Princeton, Ind.

EXTENSIONS.

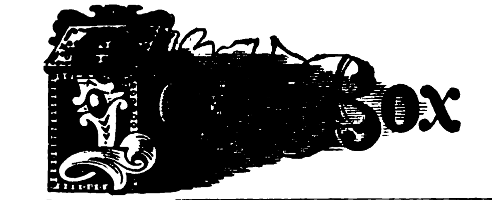
19,696.—GRINDING ATTACHMENT TO PUG-MILLS.—David H. Gage. March 23, 1858.

19,718.—TURNING AND SLIDING TABLE FOR RAILROADS.—William Sellers. March 23, 1858; re-issued Aug. 10, 1858, No. 582.

19,683.—HOT-AIR FURNACES.—John Child. March 23, 1858.

19,719.—STOP-MOTION FOR HAIR-CLOTH LOOMS.—Rufus J. Stafford. March 23, 1858.

19,783.—COMBINATION OF LEAD-PENCIL AND ERASER.—Hymen L. Lipman. March 30, 1858.



L. S. W., OF IND.—Compressed oakum would probably serve as a substitute for paper in the class of car-wheels to which you refer. As your opportunities for experiment appear to be unusually favorable, we would recommend you to fit a car with a set of your newly devised wheels, and test them by actual trial under heavy loads and high speed.

G. M., OF MASS.—Your revolving harrow differs in some minor points from others for like purpose, and on these, we think, several narrow claims can be obtained. No rotary harrow has ever yet substituted the "drag" to any important degree.

E. R., OF PA.—Your comments on asbestos, mica, etc., are simply repetitions of what we have frequently expressed in our columns. These materials can be obtained in abundance as soon as any industry calls for it.

G. L., OF GA.—The substitution of iron for wood might, in some cases, forms the basis of a valid patent. The comparative utility of a device frequently has as much to do with the protection it receives from the patent laws as its novelty, although the latter must never be wholly wanting.

O. W., OF MAINE.—If you can devise a method of putting a thin glaze on plow mold-boards during the process of "casting" which will give them a smooth surface and prevent rusting, clogging in moist soil when in use, etc., it will be a very valuable thing. But we must tell you that we have doubts of your success.

Goodwin's Patent System of Steam Propulsion on Canals.

IT is asserted, by practical boatmen, that, if two or a greater number of boats having square ends are fitted close together in a series or train, so as leave small space between them, the first boat being propelled forward will displace the water from in front of each succeeding boat of the train, and there will be but little more power required to propel the whole train—one boat in front of the other—than would be required to propel one boat separately. It is reasonable to suppose that nine-tenths of all the power used in propelling the ordinary boat is expended in displacing the water, one-tenth only being utilized to overcome the inertia and the friction of the water on the bottom and the sides. Therefore the water being displaced by the front boat is also displaced from in front of each succeeding boat, and consequently one-tenth of the amount of power required to propel the front boat is all that will be necessary for each succeeding boat that follows, as the whole train constitutes one single boat put together in sections. This may be proved by attaching and detaching the boats or sections to and from a train, and testing the speed at which a given power will propel it. It will be found that casting a section loose or adding a section on will not increase or decrease the speed of the train by more than one-tenth of the original motion.

Assuming this as a basis of calculation, it is evident that a great waste of labor and money is involved in placing steam power upon each boat on a canal. To place steam power upon each canal-boat would be analogous to placing a boiler and engine upon each passenger and freight car of a railroad, and indeed be more wasteful of power, inasmuch as air is easier displaced than water. In the case of a train of boats, also, there is a large advantage in passing through locks, as the same set of hands can manipulate all of them, and couple them up, while the tow-boat carries them through expeditiously one after the other.

The engravings illustrate a system of canal-boat propulsion on this plan, patented Jan. 11, 1870, by William F. Goodwin, of Metuchen, N. J. The large view (p. 232) shows the relative arrangement of the boats forming the train, and the manner in which the wheel of the foremost boat is driven by direct action from the engine. Fig. 2 illustrates the construction of the wheel and its action upon the water to avoid the heaping up in front of the boat and depression behind, as indicated in Fig. 3, which shows the position and action with reference to the water of an ordinary canal-boat urged

Fig. 2

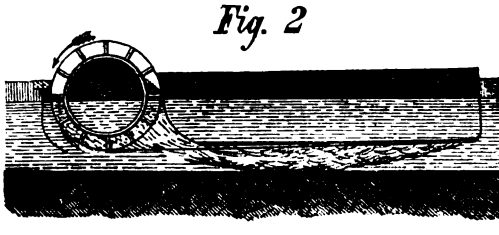
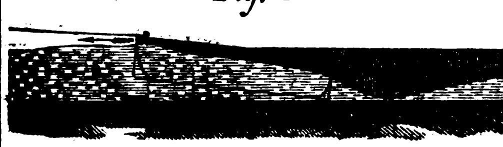


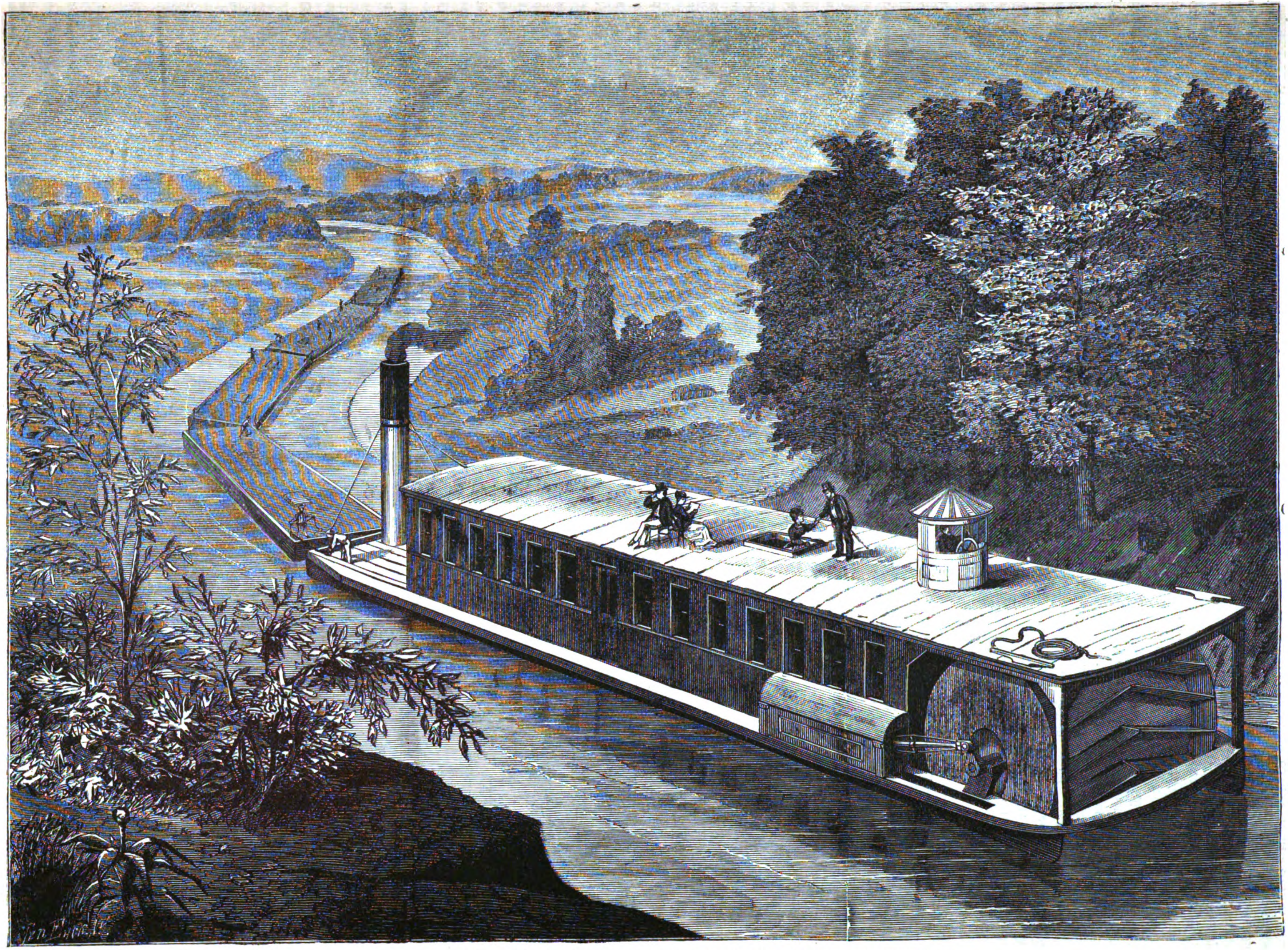
Fig. 3



along by a tow-line in the usual manner. The peculiarities of the invention comprise a canal-boat having straight sides, which extend from end to end the full length of the boat, and project in front of the rake or closed end thereof sufficiently to inclose a propelling-wheel located in front of the bow of the boat. Also, a floating propeller-wheel, traveling in front of the boat, for the double purpose of drawing the boat and displacing the water by driving it under the bottom. Also, the floating propeller-wheel, connected by hinged arms with the driving-shaft in such manner as to move around or operate upon said shaft as a center.

The following is the explanation given of the operation of this plan, involving as it does the use of a revolving or cylindrical propeller, furnished with peculiarly shaped paddle-blades, and traveling in front of the main boat. "The propeller, displacing the water from in front by forcing it under, adds buoyancy to the succeeding train, drawing it forward as above described, being materially aided by gravitation—the space between the revolving boat and the tow-boat, and the spaces between each section of the train, being filled with dead water, which is carried along with the motion, while it effectually precludes the action of the current from impeding its forward progress, as it must inevitably do if the boats were placed so far apart as to give space for a current to flow between

them, and by this means the front boat is made to displace the water from before the succeeding sections. Now, in this case, the front boat is a revolving boat, which by its revolution effects the displacement at the same time that it gets the impelling impact, and it by this means neutralizes the resistance which by any other mode has to be overcome. The shape of the bucket enables it to utilize the downward pressure on the water, because it lifts out on the opposite side without carrying any considerable weight of water to neutralize its force in a vertical direction. On the contrary, the tendency of the revolving-wheel is to lift the boat out of the water, leaving less water to be displaced, requiring less force for displacement, increasing the buoyancy, and adding to the propelling force; and by no other means than this can the water be displaced from in front of the boat without casting it against the forward end, and thereby creating that resistance which requires so much power to overcome. It is therefore claimed that this propeller is the simplest and most economical in its construction and operation of all the plans heretofore known."



GOODWIN'S PATENT SYSTEM OF STEAM PROPULSION ON CANALS.

AMERICAN ARTISAN

BROWN, COOMBS & CO., Publishers.

ISSUED WEEKLY AT

No. 189 Broadway, New York.

H. T. BROWN. J. W. COOMBS.

WEDNESDAY. APRIL 10, 1872.

EXTENSION OF PATENTS BY CONGRESS.

THE four great sewing-machine manufacturing companies of this country have established a community of interests which, in some respects, enables them to operate with the same directness and uniformity of purpose as a single corporation. This is shown in the persistent effort now being made to secure the extension by Congress of the patent on Wilson's feed motion, patented in 1850, and which, having been once extended by the Commissioner, has been protected by patents during a period of twenty-one years. In this time the four companies have, it is stated, made and sold nearly two millions of machines, and their aggregate assets are estimated at fifty millions of dollars.

The object of granting monopolies by letters-patent is to reward inventors for giving useful improvements to the country, and, when the inventor has enjoyed his reward, his invention passes as a matter of right and justice to the public, just as does anything else that has been duly purchased and paid for. If he requires more than this, he asks for what does not belong to him, and for what should not be given him to the detriment of others. In the case before us, the owners of the expired patent have received enormous profits, for a sewing-machine that sells for sixty-five dollars can be made for twelve; and the further reward that they ask for must, for the most part, come from the laboring and industrial portion of the community, sewing-girls, small manufacturers, and families, who are the last that ought to be specially taxed to add to the recompense, already colossal, that the public has already paid for the use of the improvement.

Neither, looking wholly to the interests of inventors as a class, is it desirable that this patent (or any other under like conditions) should be extended. Every inventor who improves upon the subject-matter covered by a previous but existing patent expects, as a matter of course, to pay proper tribute to it, and, if it was granted previous to the act of 1861, expects to run the risk of being met by an extension. As far as concerns all this, he knows what to look for, and can make his calculations accordingly. But when, after the expiration of a patent already once extended, he finds himself suddenly confronted by special legislation making him tributary for another term of years, he must choose between giving up a share of his own well-earned profits or abandoning his business. This is wrong on the face of it, and we are steadfastly opposed, on general principles, to the extension of patents by Congress, no matter how skillful the special pleading by which it is sought to urge them through.

There is also one other reason why the great body of inventors should oppose the extension to which we have more specifically referred. The combination controls the sewing-machine manufacture, and no new improvement can be widely introduced except at its option and upon its own terms. But let the business take the natural course of opening to competition as the patents expire, improvements will meet with more careful attention and wider demand. Nor need it be supposed that the profits of the present companies will be unduly curtailed by the refusal of Congress to protect them by special legislation, at the expense of the industrial community. They have the experience of two decades, an immense capital, battalions of skilled operatives, the most improved mechanism for manufacturing, and business arrangements of the most complete and comprehensive character. If, with these advantages, they cannot compete with others that have patiently waited twenty-one years for the expiration of these vested rights, they are hardly fit subjects for sympathy.

ARTESIAN WELLS ON THE WESTERN PLAINS.

IT is asserted that the garrison at Fort Russell, Wyoming Territory, have need of a more permanent source of water supply, and an effort is being made to secure from Congress an appropriation of ten thousand dollars to sink an artesian well. Aside from the chance of providing water to the post, the outlay would be well applied in determining whether, in that region, reliance can be had upon artesian wells for the water needed for irrigation, if not for large fields, at least for gardens and orchards. The experiment is by many thought to have but doubtful chances of success, while, on the other hand, it is a cherished theory on the dry plains that subterranean reservoirs lie below, and only need to be pierced by a boring tool in order to water the arid soil until it is green with grass and bright with fruit and flower. If the Government trial should be made and prove successful, private capital would soon multiply the number, and add marvellously to the agricultural resources of hundreds of square miles of land that is now of little value. The amount required is but a small proportion to the benefits hoped for from its expenditure; the sinking of wells in Llano Estacado some years since by the Government furnishes an apt precedent; and, all things considered, it is to be hoped that the attempt to solve the problem of watering the desert by deep-sunk wells should meet with the assistance asked for.

COMPULSORY STAMPING OF BOILER PLATES.

THE *Iron Age* responds to our comments on the new law requiring the testing and stamping of all plates used in marine boilers. Let us consider the courteously suggested arguments of our cotemporary. The *Iron Age* holds that "the only reason why bad boilers are made at all is because the owners of steam-vessels will not pay the price of good ones." Conceding this to be true, will it not be well to put poor material out of reach by making the manufacturer sell such only at the peril of punishment for all mischief resulting therefrom? It also says that we must know that, "if cheap and inferior plates are wanted, certain unscrupulous manufacturers would willingly furnish them, stamped to order, without reference to their actual tensile strength." We have no doubt of this; but we would have the material sold by such manufacturers identified by their mark, and would have them promptly punished as soon as detected. The *Iron Age* also claims that the law relieves "the owners of boilers from much of the responsibility which they should be required to assume, since, if their boilers exploded, they could shift the blame upon the makers of the defective plates." The real responsibility for explosions is commonly somewhere between the owners of the boiler, its builder, or the plate manufacturer. The best way for the latter to escape censure is to provide plates so thoroughly tested before use that the probabilities in case of casualties shall be all in his favor. As the safety of any boiler, whatever the skill shown in its construction or the care taken of it, depends directly upon the strength of the metal, it is difficult to see why the plate makers should be allowed to hide their share of the responsibility behind either the users or the builders in case of disasters.

Our cotemporary goes on to say that the plate makers "are prepared to sell good plates to any one who will pay for them what they are worth," and more of the same tenor. It seems to us that the direct tendency of the law is to make every one pay what good plates are worth by, if such a thing be possible, shutting all others out of the market. Since the law has been in force, however, the rolling mills throughout the country have brought affairs to a dead-lock by stopping the manufacture of plates for marine boilers, and notifying their customers that they will no longer supply them. This is done, of course, to force Congress to repeal the law. We hope it will not succeed.

For it is time that the lives of the people came to be considered of as much importance as the profits of manufacturers, and the law referred to not only aims to do this by holding to strict responsibility the maker of boiler material, but also the constructors of steam-generators. By it the use of that relic of barbarism, the drift-pin, for making rivet holes come fair, is forbidden under heavy penalty, as are also the vending of boilers known to be defective in flues, flanges, riveting, bracing, or other essential particulars. Let the law be supplemented by another holding owners of steam-vessels to equal accountability for the care of boilers, and our periodical holocausts of people blown to death by explosions will, if the legislation is rigidly enforced, be quickly numbered with things of the past.

THE BRITISH CHANNEL FERRY.

ALTHOUGH accounts have hitherto reached us intimating a decision as to a plan of Channel ferry-boats, and their terminating English and French ports, discussion in favor of more improved schemes seems to continue through the columns of some English papers, particularly such as profess local claims.

A correspondent of the Folkestone *Express*, Capt. Newman, R.N., argues, with apparently and, according to our own observation, with much good reason, in favor of Folkestone and Boulogne for the ports of arrival and departure over those of Dover and Calais or Andresselles.

Sir Edward Watkins, chairman of the South-eastern Railway Company, seems also to have considered the Fowler and Scott Russell scheme as "pretty well condemned," whilst the editor of the Folkestone *Express*, in a lamentable article on the subject of ferry improvements, considers the case a hopeless one. He says:—"England could find a man with perseverance enough to fill up

Chat Moss; England could find a man with invention enough to put a girdle around the world; England could find a man with practical genius enough to bridge Menai Straits; but the Channel beats even the productive power of England—that most unreduceable 'strip of silver' laughs at us. . . . The various dodges by which, in future, we are told we can cross without feeling any motion, remind us painfully of the dodges people will persist in telling us are infallible to prevent seasickness under our present *régime*. Lie on your back and look at the cabin ceiling; or, better still, shut your eyes; or, better still, go to sleep; or, better still, sit upright on the deck; and look at the sky. This last, perhaps, is the severest mockery: it may last five minutes till you are out of the harbor, and then down comes about three gallons of cold water between your chin and neck-tie, seven sailors tread on your toes, three men put mackintoshes on you, five ask you if you want a basin, and the boat turns over every minute apparently, and you are supposed to go on looking at the sky." Whilst many of our readers have been able, through experience, to contrast the above often well-pictured contingencies to crossing the Straits of Dover with the luxurious comforts of our splendid Long Island Sound or Great Lake steamers, that weather steadily the worst of seas, many others may not know that the British Channel steamers are but little, narrow boats, drawing as much water as many of our steamers of the largest class, and with no security on deck against storms or splashing spray, in fact no inclosure except confined quarters below, the atmosphere of which is generally more or less tainted with the effects of sea-sickness.

Another correspondent of the *Express*, who has probably had some experience with our system of steamboats, and "ventures to think that such a want as that of the Channel ferries on American waters would have been supplied twenty years ago," urges the investigation of a plan of train-bearing ferry-boats, intended to ply between Folkestone and Boulogne, a treaty for the adoption of which was commenced with the French Government some years since, by Mr. Thomas Silver, of New York, a former reference to which was also made in the AMERICAN ARTISAN some time since.

Englishmen are a great commercial people, and are even the bankers of the world; but England is much behind the world in many branches of mechanical science, and always slow to develop the resources of the laws of nature.

Although "England could find a man with invention enough to put a girdle around the world," all the world outside of England honors the inventor of practical telegraphy as a native citizen of the United States.

There are many leading and most important inventions of the day that are decidedly un-English, but it may suffice for the present to say that England has never yet produced a steamboat. The lengthened clipper ship is still the type of English steamers, from the penny boat of the river Thames to the mammoth *Great Eastern*, all of a rolling and uneasy description, and requiring canvas in a sea-way to keep them steady. All English ideas tend to build vessels of all descriptions deep and narrow, to give them, as they call it, "a hold on the water," whereas the true secret of a successful steamboat is that form or model that is calculated to run the nearest "between wind and water," leaving it for the machinery to take hold upon the latter elements. If John Bull is disposed to abandon "the old salt" when circumstance requires, and apply mechanical adaptations to the nature of the case, there may be some hopes of the establishment of a respectable ferry over the Straits of Dover.

Steam Tramway-cars.

It is indisputable that the tramway system is on the whole successful in London; so successful, at least, that its extension is simply a question of time. Of course, there are people opposed to tramways who write to the *Times*, and tell its readers that the wheels of their broughams are broken and that their horses are lamed by the grooved iron track laid in some of our metropolitan roads. But tramways are not intended to please the owners of broughams and horses, but an infinitely more numerous class; and the members of this class like the tramways very much indeed, and advocate their extension to districts in which nothing but the omnibus or the cab is now to be found. Successful as the tramway system is, it is nevertheless obvious that it is open to improvement, and it is certain that the improvement will be effected. We shall have better rails better laid, and improved cars, and more comfort, and cheaper fares, and larger dividends for the shareholders; but about the rails, the cars, or the dividends, it is not our purpose to speak at present. Instead, we propose to consider the possibility of getting rid of horse labor altogether, and propelling our street tramway-cars by steam power. A great deal of misapprehension exists on this subject, which is not confined to the minds of the general public. On the contrary, men who ought to know better have not hesitated to say that the thing is impossible. That this opinion has no sound basis we shall endeavor to show. The principal objections urged against the use of steam on our tramways are, first, that it would render the cars a nuisance, because the steam and smoke would escape into the air, and annoy foot-passengers, householders, and others; secondly, that the engines would make a great noise; thirdly, that they would frighten horses; and, lastly, that they would be very dangerous. Every one of these objections was urged against the use of steam on railways thirty or forty years ago, but they did not impede the progress of the railway system. We think it can be proved that they would not apply at all to properly constructed steam tramway cars.

The best tramway-cars now running in London weigh about 2 tuns 5 cwt. empty, but we shall be nearly correct if we take the average weight at 2 tuns 10 cwt. Forty passengers may be taken to weigh as much more. We have, then, a gross load of five tuns as representing the ordinary net weight to be propelled. An average velocity of six miles an hour will meet all requirements, and at this speed the resistance per tun cannot exceed 10 lbs. on a dead level with the rails clean and dry. As, however, the rails are usually anything but clean, and the wheels are small, we shall take the resistance at 20 lbs. per tun, and therefore assume that a dead pull of 100 lbs. will be required to keep a loaded tramway-car in motion at the rate of six miles an hour on a level. On inclines the resistance will, of course, be increased. On a rise of 1 in 40 the tractive force must reach 380 lbs., while on an incline of 1 in 30, which is the very steepest hill on which a street tramway is, in our opinion, admissible, it must amount to 473 lbs. It is just possible for two good horses to take a tramway car, weighing with its load five tuns, up an incline of 1 in 30 at a very moderate pace. Any motive power in the shape of an engine which will exert a tractive force of 100 lbs. per tun will much more than meet all the requirements of the most difficult case which it is possible to imagine.

Now, a velocity of six miles an hour is 528 feet per minute, and this, multiplied by 100 lbs., gives 52,800 foot-pounds as the work required to take one tun of tramway-car up an incline of 1 in 30. We have seen that the net weight of the tram-car and its load would be five tuns, consequently the total work to be done would be 264,000 foot-pounds per minute, or exactly 8 effective horse-power. A suitable steam-engine, boiler, etc., will probably weigh 1 tun 10 cwt.; add this to the weight of the loaded car, and we have 6 tuns 10 cwt. The additional power required to deal with the weight of the engine amounts to 79,200 foot-pounds, or 2·4 horse-power. The indicated horse-power ought to exceed the effective by about one-fourth; and, making this allowance, we find, as the result of our calculations, that the maximum power which can by possibility be required in a street tramway-car, propelled by steam, is 13 horse-power indicated. An engine and boiler weighing 30 cwt. would, with ease, exert double this power for an hour at a time. We need scarcely state that it is quite within the reach of the most ordinary practice to provide an engine and boiler which shall not weigh more than 30 cwt., and yet will suffice to meet the most extraordinary demands that could be made on the powers of propelling a tramway-car. Now, let us see how much power would be required under ordinary circumstances. The answer is ready to our hand. Two good horses do the work; and, allowing that each of these animals exerts 75 per cent. of an indicated horse-power—which is over the mark—we still find that an engine working up to a little over 2 indicated horse-power would do all that is generally required. The steam-engine fitted to the tramway-car should therefore have cylinders so large that at six miles an hour it might exert 13 horse-power if a short bit of incline had to be surmounted, as, for example, in crossing a steep bridge; but under ordinary circumstances these cylinders would be worked very expansively by the aid of the link-motion. The result would be that the blast would be so far softened that the escaping steam would make little or no noise. Another and most important advantage conferred by the large cylinders would be the power of starting the cars rapidly into motion. A speed of six miles an hour is 8·8 feet per second, and this is very nearly the velocity which would be acquired by the car in falling through a distance of one foot. Most of our readers will, we think, understand us when we say that these figures prove that, to get the car into motion at the rate of six miles an hour, 14,560 foot-pounds of energy must be expended over and above the force required to overcome frictional resistance, this 14,560 foot-pounds remaining stored up in the car, to be given out again when it is being brought to rest. If the work of starting the car from a state of rest to one of motion be performed in 10 seconds, it follows that during each second 1,456 foot-pounds of work must be done, or, say, 2·6 horse-power. From which it will be seen that on a level the engine should exert about 2½ times more power at starting than will be required when the normal velocity has been attained. All this is perfectly consistent with working conditions. There is not, in a word, the slightest difficulty in designing engines and boilers which will comply perfectly with the required stipulations as to weight and power. If any proof of the truth of this statement is required, it may be found in the fact that Messrs. Shand & Mason's light Brigade engine,

weighing complete, with carrying-wheels, framing, hose-reel, etc., 35 cwt., has indicated 33 horse-power with ease. There is no trouble, therefore, in producing an engine and boiler alone weighing more than the fire-engine complete, which would, if needful, work up to 13 horse-power, while their normal power would not necessarily exceed from 2 horse-power to 5 horse-power indicated. As regards the nuisance question, we have already shown that the "beat" of the engine would be almost entirely got rid of. It would be quite removed by turning the waste steam into a large cast-iron hollow deflector, as is done in Field boilers, from which it would escape continuously, highly superheated, and completely invisible. If good selected coke was used as fuel, no one in the street or in the car need be aware that a steam-engine was used at all. In proof of this statement, we may refer to Messrs. Moreland's steam rollers, in which the waste heat is superheated as we have described. Nothing whatever can be seen coming from the chimney, even when the engine is working to its greatest power.

The danger theory does not deserve a word of refutation, in so far as it refers to the chance of accident to those within or upon the cars, caused by a failure of the boiler or machinery. As regards the chance of accident by collision, that is purely a question of brake power. To stop the car would require precisely the same expenditure of energy as was needed to impart a velocity of six miles an hour—or, in other words, 14,560 foot-pounds. The coefficient of friction on a tram rail—which is always more or less gritty—cannot be much less than one-sixth of the load. The load in the case we are considering is 6·5 tuns, or 14,560 lbs., and one-sixth of this is 2,426·6 lbs. Each foot therefore traversed by the vehicle with the brakes hard on will represent 2,426 foot-pounds of energy expended in overcoming the friction between wheel and rail, in round numbers, and, dividing 14,560 by this, we find that the car can be stopped on a level in a space of about 6 feet, which is less than that in which an existing car or a common omnibus can be pulled up. With common care on the part of the driver, no accident whatever could occur from collisions.

We believe that we have made out a good case so far as we have gone for the steam-propelled omnibus, although we have not said a syllable concerning the advantages it holds out to shareholders and others. These and one or two other points we shall probably deal with in future articles.—*The Engineer.*

NEW AMERICAN PATENTS.

We give, as follows, notices of some of the most interesting inventions for which Letters-Patent of the United States have recently been issued:—

APPARATUS FOR EXTINGUISHING FIRES IN INFLAMMABLE LIQUIDS.—H. Baker, Chicago, Ill.—*March* 26.—This invention comprises the combination of a tank and suitably arranged cover and tubes. Also, the combination with such tank for containing inflammable liquids of a perforated gas-conductor, so constructed and arranged as to discharge gas quickly over the entire surface of the fluid contained in the tank.

FOLDING CRIB.—A. J. Bettridge, North Bridgewater, Mass.—*March* 26.—This is an improved portable folding crib, consisting of a supporting frame formed in detachable and folding sections, and a textile couch suspended within the frame, and provided with a folding frame or mattress supporter, the whole being arranged for conjoint use.

WASHING MACHINE.—C. Gates, Littleton, N. H.—*March* 26.—This inventor claims the arrangement at each end of the roll in a washing machine, and between that end of the roll and the frame adjoining, of a cam and friction-roller, whereby the roll when rotated is acted on alternately at each end in order to obtain a reciprocating movement in the direction of its length. Also, the combination of the upper roll, supported in stationary bearings, and acted on at each end by a cam and friction-roller arranged within the compass of the sides of the frame, with the lower roll supported in sliding bearings pressed upward by means of springs. Also, the combination with the lower roll and its sliding bearings, of a partition board, arranged below said roll, and connected and moving up and down with the said bearings.

RUFFLING ATTACHMENT FOR SEWING-MACHINES.—W. L. Gray and O. T. Joy, Watertown, N. Y.—*March* 26.—This device is constituted by the combination with a spring feeder, and reciprocating rod to which the same is attached, of a U-shaped cam and adjusting mechanism, through the medium of which a back-and-forth movement is imparted to the feeder.

WATERPROOF HOSE.—T. L. Reed, Providence, R. I.—*March* 26.—This improved waterproof hose is composed of alternate sheaths or layers of india-rubber, gutta-percha, and other flexible and vulcanizable gum, and fibrous material plaited or braided thereon.

STRETCHING-BOARD FOR LEGS OF PANTALOONS.—E. T. Smith, Salem, Mass.—*March* 26.—This invention includes stretchers or former blocks for distending and reshaping the legs of pantaloons when made with flat sides and with edges having rounded angles or corners, and outlines suited to give the desired shape to the bottoms of such legs when provided with a wedge suited to the thickness of the blocks and adapted to be inserted in such manner as to expand them. Also, springs suitably arranged in connection with and attached to the blocks.

GUN-LOCK.—J. C. Dane, La Crosse, Wis.—*March* 26.—This device embraces, in combination with a gun-lock hammer and main-spring, a stop arranged in such manner as to arrest the action of said main spring before the full throw of the hammer is completed, in order to prevent the hammer resting with force upon the point struck. Also, in combination with the subject matter of the above clause, a tumbler provided with a cam-shaped end and sear, so that the said sear will force the tumbler to return.

DRIER.—E. Foot, East Bloomfield, N. Y., and M. P. Smith, Baltimore, Md.—*March* 26.—This includes a mode of supplying air to drying machines, by introducing it at or near the top or upper portion of the drying chamber, causing it to descend through or around the platforms or trays containing the drying substances, and finally to escape from the lower portion of the chamber. Also, the process of drying animal or vegetable substances by placing the same on rising or falling platforms, and exposing the same to a descending current of heated air. Also, certain novel devices used in connection with such current in the drying chamber, and designed to increase the efficiency thereof.

MANUFACTURE OF POTASH AND PHOSPHATE OF LIME.—M. B. Manwaring, New York City, and R. D. W. Birch, Philadelphia, Pa.—*March* 26.—This relates to the manufacture of potash from the hull of the cotton-seed. The potash is extracted by boiling the ashes of the hulls in water and adding lime thereto; the claim also covering the production of phosphate of lime from the hulls or the ashes of the same.

RAILROAD-CAR HEATER.—C. F. Pike, Providence, R. I.—*March* 26.—Aside from a novel arrangement of exhaust-pipes, pipes, heaters, registers, and ventilators, this invention consists in a peculiar method of warming and ventilating railroad-cars, consisting in passing steam through pipes in contact with a system of coils or pipes inclosed in air-flues, boxes, or chambers, so that the steam heats the liquid in said coils or pipes, and the liquid, by automatic circulation, heats the air so as to warm and ventilate the cars.

SIGNAL FOR RAILWAY CROSSINGS.—C. F. Pike, Providence, R. I.—*March* 26.—The gist of this invention is found in the combination of a series of keys inserted or arranged alongside of the rails, and connected by chains, wire ropes, or pneumatic tubes to operate a bell, or gong, or other device, to automatically and continuously sound an alarm when the train of cars passes over said keys; certain supplemental devices are also included in the claim.

PROCESS AND APPARATUS FOR RENDERING FATS, ETC.—M. J. Stein, New York City.—*March* 26.—The most noticeable features of this improvement are found in the extraction of fat and water or other liquids by subjecting the material to both heat and pressure. Also, in an apparatus for rendering and pressing the material, the combination with a digester of a platen or its equivalent, and suitable means for operating it, whereby the cooking and pressing may be effected. Also, the combination with the vessel of a perforated movable plate and a suitable exit-pipe, arranged in such manner that the solid and liquid matters are separated into separate compartments, from which they may be separately discharged.

APPARATUS FOR VAPORIZING AND BURNING HYDROCARBONS.—S. J. Whiting, Philadelphia, Pa.—*March* 26.—This relates to that class of hydrocarbon vaporizers wherein an oil-pipe and a steam pipe communicate with each other, and embraces the use of an auxiliary pipe for the union of a jet of steam with the vapor passing from the generator.

ELECTRO-MAGNETIC APPARATUS FOR STEERING TORPEDO BOATS.—J. G. Foster, Nashua, N. H.—*March* 26.—This is a novel method of operating the steering devices of a torpedo-boat by means of the direct application of the electricity to the same. There is also claimed in combination with an electro-magnetic apparatus for steering torpedo-boats a suitably arranged reel or drum. Also, the combination of batteries with the magnet, drum, and rudder.

APPARATUS FOR MANUFACTURING COAL-GAS.—A. M. Giles, Boston, Mass.—*March* 26.—The most prominent characteristic of this apparatus is found in a series of retorts, each provided with a dip-pipe, and connected with a common pipe communicating with the upper portion of the hydraulic main, or with a secondary main or receiver, in combination with a valve or cut-off, so arranged that when shut it will prevent the gas from passing from the retorts into the pipe in common, or from the pipe of one retort into that of another, and when open will allow the gas to flow freely and without pressure from the whole series of retorts to the desired point.

CASTING COPPER TUBES.—J. F. Guthrie, South Bridgewater, Mass.—*March* 26.—This process involves the employment of a mold case in combination with a revolving distributing hopper for conducting the molten metal to the mold. There is also included in the claim the revolving distributing hopper as provided with two or more distributing tubes.

UTILIZING THE EXHAUST OF STEAM-ENGINES.—E. Körting, Berlin, Prussia.—*March* 26.—Aside from certain minor features, this invention consists in the utilization of the exhaust steam of steam engines by exhausting the same into a reservoir, provided with a check-valve arranged to operate in a manner whereby the exhaust steam is retained in the reservoir and the back pressure on the engine prevented, thus enabling the exhaust steam to be used for other purposes.

LEAD-PENCIL HOLDER.—Edward Weissenborn, Hudson City, N. J.—*April* 2.—The principal object of this invention is to provide for the better holding of wood-encased lead and other pencils preparatory to and during the varnishing or coloring of them, by dipping them into the varnish or coloring material, in which operation the pencils have to be held as close as practicable to one extremity, and kept as near as practicable together, and yet separate along their whole length. The invention consists in a novel construction of one edge of a holding-bar, whereby the pencils are very securely held therein in the requisite manner and relation to each other, without being seriously injured or marred by the holding devices. It also consists in a table or bed of novel construction, to be used in connection with the bar above mentioned, to insure the proper insertion of the pencils thereinto.

IMPROVEMENT IN VALVES.—Francis Windhausen, Brunswick, Germany.—*April* 2.—While this invention is applicable to various purposes, including the letting on of steam by the direct action of the piston of an engine, to work expansively in the cylinder of the latter, and the quantity so admitted may be regulated automatically by the

governor of the engine, it is chiefly designed for attachment to an ice-making or freezing machine, in which atmospheric air is compressed, then passed through a cooler, and afterwards expanded again to remove the heat, or, in other words, to produce cold. The invention consists in a valve of novel construction, operated by the direct action of the piston in said cylinder as it approaches and reaches the one end of its stroke, and being composed in part of an air-compressing piston and cylinder for controlling the motion of the valve proper, and for insuring a proper supply of air to the working cylinder of the apparatus.

ROOFING-PLATES.—Thomas N. Hickcox, Brooklyn, N. Y.—*April* 2.—This invention consists in roofing-plates, having their surfaces corrugated or embossed with diamond or other shaped figures, except at the edges, where they are united by solder in the ordinary manner, such plates obviating all buckling of the roof by expansion occasioned by an increase of temperature.

CENTRIFUGAL SUGAR MACHINE. — Ludwig Weinrich, Berlin, Prussia.—*April* 2.—This invention relates to centrifugal machines, in which the sugar mass is exposed to the action of steam and air, for the purpose of purging and purifying the same, and the invention consists in a peculiar and advantageous construction of the machine, including a removable construction of the cover of the machine, with upper and lower attachments to facilitate access to the interior of the cage, devices or arrangements for preventing water of condensation from reaching the sugar, and a removable ring, provided with fastenings, disposed on the top of the cage, to facilitate the working of sugar mass in lumps.

HARNESS BUCKLE.—Charles Maxwell and John G. Lindner, Syracuse, N. Y.—*April* 2.—This invention consists in a novel construction of two or more buckles on one frame, whereby great facility is afforded for adjusting different parts of a harness or other article to which the buckle is applied, relatively to each other.

SODA-WATER COOLER.—John Matthews, New York City.—*April* 2.—This invention relates to coolers such as are ordinarily used for cooling soda-water and other gaseous or aerated liquids, and which are for the most part made up of tubes arranged to form the base, or base and walls, of an ice chamber, and through which tubes the liquid to be cooled is circulated while the ice is packed on and between them. To this end, said tubes have heretofore been of circular form in their transverse section and arranged in close proximity to each other, thus presenting at best but half their area to direct contact with the ice, and requiring the ice to be very finely cut or broken to insure even this exposure. This invention consists in a triangular or approximately triangular construction of said tubes, or certain of them, constituting the base or walls in part of the ice chamber; likewise in forming said tubes with projections on their interior surfaces, the same constituting conductors which add to the efficiency of the tubes.

ARTIFICIAL STONE.—Fritz Lürmann, Georgsmarienhütte, Prussia.—*April* 2.—This invention consists in the mixture of the cinder of blast furnaces with quicklime or other caustic material or cement. To carry out the invention, blast-furnace cinder is taken and placed in a suitable vessel or receiver, and granulated either by pouring in water or by mechanical means, and it is then mixed with quicklime or other caustic material or cement. The mass is then put into molds or otherwise collected and pressed or formed into any required shape, using for the purpose either hand-force, steam-power, or hydraulic pressure. The composition or article into which it is thus formed is afterwards hardened by exposure to the air, no artificial heating or burning being necessary.

SECURING PUNCHES TO THEIR STOCKS.—John Johnson, New York City.—*April* 2.—This invention relates to punches for punching the rivet holes in boiler-plates and for other purposes. Heretofore, the punches in such machines have been ordinarily secured in their stocks or holders simply by friction, and to obtain sufficient surface therefor have been of considerable length, to enter correspondingly long sockets. Forging them to fit the sockets in their stocks or holders is a very delicate operation, and one requiring considerable time, and when once fitted it is a difficult matter to detach them. The object of this invention is to reduce the labor of manufacturing the punches, to facilitate their attachment to their stocks and detachment therefrom, also to render their attachment positive, likewise by reducing the length of the punch to economize the amount of steel used. To this end, it consists in the combination with a stock or holder, transversely slotted above the punch-socket, of a punch capable of being inserted through the slot of the holder into its socket, said punch having its upper portion swelled or enlarged to prevent it from dropping through the socket, and a key which fits said slot, and bears on the top of the punch and retains it in place.

MACHINE FOR COLORING OR POLISHING LEAD-PENCILS.—Edward Weissenborn, Hudson City, N. J.—*April* 2.—This invention has for its principal object the uniform coloring and also the polishing of wood-incased lead and other pencils, and other similarly formed articles, in a more rapid and convenient manner than has heretofore been provided; and to this end it consists in one or more horizontally arranged cylinders for containing the pencils or other articles and the coloring or polishing material, carried upon a horizontal shaft having a rotary and a rectilinear reciprocating motion, whereby the desired end is attained. It also consists in a novel combination of devices whereby said combined motions may be imparted to the said shaft.

MACHINE FOR VARNISHING OR COLORING LEAD-PENCILS.—Edward Weissenborn, Hudson City, N. J.—*April* 2.—The principal object of this invention is the uniform raising of wood-incased lead and other pencils, or other similar articles, from the bath of varnishing or coloring material after having been dipped therein, at degrees of velocity corresponding with the nature and consistency of the said varnishing or coloring material and the thickness of the coat that is desired to be left thereon; and to this end the invention consists in a dipping machine, wherein the dipping apparatus is connected with and operated by a train of gearing, driven by a weight or its equivalent, and having an adjustable fly, whereby the desired end is attained. It also consists in a novel arrangement in connection therewith of the winding cord relatively to the winding shaft, whereby the winding up of the weight or spring allows of the simultaneous lowering of the dipping frame or holding bars and the pencils or other articles suspended thereto by their own weight.

MACHINE FOR FORMING LEAD-PENCILS.—Edward Weissenborn, Hudson City, N. J.—*April* 2.—This invention has for its principal object the forming of polygonal wooden-covered lead and other pencils from cylindrical ones by compression. It is designed more especially for the forming of such pencils after they have been stained or colored and varnished, but is also applicable to the forming of pencils in a less finished state. It consists in a heated die of the requisite form and a plunger operating to force the pencil through the die. It also consists in a novel combination of a feed-hopper, reciprocating plunger, fixed guide, and female die, whereby cylindrical pencils placed within the hopper may be fed down and forced through the die, thereby compressing the pencils into the desired form.

Safety in Foreign Mines.

THE *Mechanic's Magazine* takes the same ground with reference to provisions for safety in English coal-mines that the AMERICAN ARTISAN has done concerning those in this country. It says:—"The provision of duplicate shafts for every mine should be made compulsory, as also the delivery of compressed air in any quantity throughout the most distant of the workings. After the experience recently gained from the Mont Cenis Tunnel, there can be no doubt that the agency of compressed air is the most powerful one for ventilation; and further, if inquiry be made, it will be found that it has been practically employed in mines for this purpose with every advantage. Thus with the most ordinary precautions no accumulation of inflammable gas could occur, and mines would become practically safe for naked lights; although we would not, therefore, dispense with safety lamps."

The "Switch Back."

THE Mauch Chunk Switch Back Road will be improved in many ways. Heretofore it has been used to transport coal, and the passenger traffic has been incidental. Now the coal will be shipped via the Nesquehoning Tunnel to Mauch Chunk, and the Switch Back will be refitted and used almost exclusively for tourists and pleasure-seekers generally. It is the purpose of the gentlemen having the road in charge to build an elegant pavilion upon the top of Mount Pisgah. Walks will be laid out, and the rocky places will be made beautiful. The idea of a pavilion on Mount Pisgah is a good one. Heretofore travellers have only had a few minutes to view the scene from the top of the mountain. Under the arrangements proposed, they can stay all day if they like.

Value of a Tallying Machine.

A LATE Washington item is to the effect that the House Committee on Patents are considering the application of Chief-clerk Seaton of the Census Bureau for compensation for the use of his tallying machine. The Superintendent of the Census has informed the Committee that the use of this machine in his office has saved the Government at least $60,000 in clerk hire, and enabled him to complete the work from four to six months sooner than he could have done without it. The saving will be still greater in the next census, because a large part of the work upon the present census had been completed before the machine had been brought into use.

SOLAR HEAT.

BY CAPTAIN JOHN ERICSSON.

[From *Nature.*]

(Continued from page 212.)

WITH reference to the small differential temperature indicated by the Secchi instrument manufactured by Casella, it may be urged that it is not intended to show the true intensity of solar radiation on the earth's surface, but simply a means of determining solar temperature. Granted that such is the object, yet the extreme irregularity of the temperature of the fluid within the annular space shows that the instrument is unreliable, a fact established beyond contradiction by an experiment instituted September 27, 1871. On this occasion, water of a uniform temperature was circulated through the annular space. This was effected by gradually charging this space from the top, and carrying off the waste at the bottom, holes having been drilled in the external casing for that purpose. The result of this conclusive experiment is recorded at the foot of Table A. It will be found on reference to the figures that the mean difference of the two thermometers immersed in the fluid was only $64{\cdot}9^\circ - 64{\cdot}4 = 0{\cdot}5^\circ$, while the mean differential temperature was augmented to $79{\cdot}1^\circ - 64{\cdot}45 = 14.65^\circ$ against $9{\cdot}79^\circ$ on the 2d of September, although the zenith distance was greater and the solar intensity less; circumstances which ought to have *diminished* the indicated intensity. It is needless to enter into any further discussion of the demerits of the instrument represented in Fig. 2. We may now return to the consideration of the device delineated in Fig. 1, copied from "Le Soleil." It will be seen that the material difference of construction is that of applying only one thermometer for ascertaining the temperature of the fluid in the annular space. Possibly, this single thermometer may indicate approximately the mean temperature of

he upper and lower portions of the fluid above he central tube; but it furnishes no indication of he temperature below, nor at either extremity of he annular space. The inadequacy of the means dopted for ascertaining the temperature of the nternal surface which radiates towards the bulb f the central thermometer having thus been pointed out, it will be well to consider whether the xpedient of passing a stream of water of nearly niform temperature through the annular space will insure trustworthy indication. In order to letermine this question, I have constructed two nstruments in strict accordance with the delineaion in Fig. 1, excepting that in one of these the concentric cylinders are considerably enlarged, the annular space, however, remaining unchanged. Experiments with the two instruments prove that the enlargement does not materially influence the indications, provided water of a uniform temperature be circulated through the annular space. But these experiments have demonstrated that the size of the bulb of the thermometer exposed to the sun cannot be changed without influencing the differential temperature most materially. This will be seen by reference to Table B, which records the result of experiments with different thermometers, and tubes of different diameter, conducted October 17, 1871. As on previous occasions, the instruments, in order to insure accurate position, were attached to the declination table arranged within the revolving observatory. The bulbs of the thermometers employed were very nearly spherical, their diameters being respectively 0·30 and 0·58 inches. The upper division of Table B, which records the experiments with the *small* bulb exposed to the sun, establishes, it will be seen, a differential temperature of 14·4° for the instrument having the 1¼-inch central tube, and 16° for the one having the 3-inch central tube. Referring to the lower division of the same table, it will be seen that, when the thermometer with the *large* bulb is exposed to the sun, the differential temperature reaches 22·5° in the instrument containing the 1¼-inch central tube, and 21·1° in the one having the 3-inch tube. We thus find that, by doubling the diameter of the bulb of the thermometer exposed to the sun, all other things remaining unchanged, an augmentation of the differential temperature amounting to nearly one-third takes place. This fact proves the existence of inherent defects fatal to the device delineated in Fig. 1, rendering the same wholly unreliable.

Agreeably to the doctrine of exchanges, the diameter of the bulb is an element of no moment, since the internal radiation towards the same—*provided its temperature be uniform*—depends solely on the temperature and angular distances of the radiating point's inclosure. Infallibility of the "solar intensity apparatus" has evidently been taken for granted on the strength of the soundness of this doctrine, as we find no allusion to the size of the bulb in M. Soret's account of his observations of solar intensity on Mont Blanc; nor does Mr. Waterston, who employed a similar instrument during his observations in India, advert to the dimensions of the bulb of the thermometer exposed to the sun. The physicists apparently overlook the fact that, while the entire convex area of the bulb is exposed to what may be considered the cold radiation from the inclosure, only one-half receives radiant heat from the sun. This circumstance would be unimportant if the heat thus received were instantly transmitted to every part; but the bulb and its contents are slow conductors, while the conducting power diminishes nearly in the inverse ratio of the square of the depth. Consequently, by increasing the diameter, the parts of the bulb opposite to the sun will receive considerably less heat in a given time than if the diameter be diminished.

TABLE A, SHOWING THE RESULT OF OBSERVATIONS MADE WITH SECCHI'S "SOLAR INTENSITY APPARATUS," MANUFACTURED BY CASELLA.

SEPTEMBER 2, 1871.

Thermometer exposed to the Sun.	External Casing. Upper Thermometer	External Casing. Lower Thermometer	External Casing. Mean.	Differential temperature.	Zenith. distance.
Fahr.	Fahr.	Fahr.	Fahr.	Fahr.	° ′
83·5	76·0	70·0	73·0	10·5	33 0
84·2	77·0	71·5	74·2	10·0	
85·5	79·0	74·2	76·6	8·8	32 50
86·0	83·5	74·5	79·0	7·0	
89·0	84·0	75·5	79·7	9·2	33 0
90·5	85·0	76·5	80·7	9·2	
92·0	85·5	78·0	81·7	10·2	33 10
93·0	86·5	79·0	82·7	10·2	
94·0	87·8	80·0	83·9	10·1	33 21
94·5	89·0	81·5	85·2	9·2	
95·5	90·0	82·5	86·2	9·2	33 32
96·5	90·5	83·5	87·0	9·5	
98·0	91·5	84·5	88·0	10·0	33 44
99·0	92·0	85·0	88·5	10·5	
100·0	93·0	86·0	89·5	10·5	33 56
101·0	93·5	86·5	90·0	11·0	
101·5	94·0	87·0	90·5	11·0	34 8
93·1	86·9	79·5	83·3	9·79	33 24

SEPTEMBER 6, 1871.

94·5	88·0	81·5	84·7	9·7	35 56
95·5	88·5	83·0	85·7	9·7	
96·5	89·5	84·5	87·0	9·5	35 41
97·5	90·0	85·0	87·5	10·0	
98·0	90·0	85·0	87·5	10·5	35 26
98·5	90·5	85·5	88·0	10·5	
99·0	90·5	85·7	88·1	10·9	35 11
100·0	91·0	86·5	88·7	11·2	
100·3	91·0	87·0	89·0	11·3	34 56
100·3	91·2	87·5	89·3	11·0	
100·5	91·5	88·0	89·7	10·8	34 41
98·2	90·2	85·3	87·8	10·45	35 33

SEPTEMBER 27, 1871.

78·5	64·0	64·0	64·0	14·5	44 0
79·0	65·0	64·0	64·5	14·5	
79·5	65·0	64·5	64·7	14·7	44 55
79·5	63·0	65·0	64·0	15·5	
79·5	64·0	65·0	64·5	15·0	45 51
79·0	64·5	65·0	64·7	14·2	
79·0	64·5	65·5	65·0	14·0	46 48
79·0	64·5	65·5	65·0	14·0	
79·0	65·0	65·5	65·2	13·8	47 46
79·1	64·4	64·9	64·65	14·45	45 16

TABLE B, SHOWING THE RESULT OF EMPLOYING DIFFERENT THERMOMETERS.

DIAMETER OF BULB 0·30 inch.

1¼ inch tube. Sun.	1¼ inch tube. Fluid.	1¼ inch tube. Diff.	Zenith distance.	3 inch tube. Sun.	3 inch tube. Fluid.	3 inch tube. Diff.	Zenith distance.
Fahr.	Fahr.	Fahr.	° ′	Fahr.	Fahr.	Fahr.	° ′
74	60	14	50 32	77·5	62·1	15·4	49 54
74·5	60·3	14·2	50 24	78·5	62·3	16·2	50 3
75	60·7	14·3	50 16	79	62·5	16·5	50 12
75·5	61	14·4	50 8	79	63	16	50 21
76	61	15	50 1	79	63	16	50 30
75·0	60·6	14·4	50 16	78·6	62·6	16·0	50 12

DIAMETER OF BULB 0·58 inch.

83·6	62·6	21	49 54	79·2	60·1	19·1	50 32
85·5	63	22·5	50 3	81	60·3	20·7	50 24
86·4	63·4	23	50 12	82·5	60·7	21·8	50 16
86·7	63·5	23·2	50 21	82·7	60·7	22	50 8
87·7	63·7	23	50 30	83	61	22	50 1
85·9	63·2	22·5	50 12	81·7	60·6	21·1	50 16

ENGLISH PATENT JOURNAL.

[*This list is condensed weekly from the "Journal of the British Commissioners of Patents," expressly for the* "AMERICAN ARTISAN."]

624.—METALLIC ALLOYS.—G. H. Smith, New York City.—Feb. 28, 1872.

628.—MACHINE FOR CUTTING FILES.—A. Weed, Boston, Mass.—Feb. 28, 1872.

635.—SAW.—E. M. Boynton, Grand Rapids, Mich.—Feb. 29, 1872.

641.—COLORING PHOTOGRAPHS.—Henry Van der Weyde and O. Sarony, New York City.—March 1, 1872.

657.—NAIL MACHINE.—M. D. Whipple, Brighton, Mass., and L. W. Whipple, Boston, Mass.—March 2, 1872.

675.—BREECH-LOADING ORDNANCE.—Nathan Thompson, Brooklyn, N. Y.—March 5, 1872.

676.—HOISTING APPARATUS.—W. D. Andrews, Brookhaven, N. Y.—March 5, 1872.

679.—RAILWAY RAIL.—G. W. N. Yost, Corry, Pa.—March 5, 1872.

710.—SEWING-MACHINE.—J. A. House, Bridgeport, Conn.—March 8, 1872.

717.—MACHINE FOR CLEANING COTTON.—N. B. Hall, Providence, R. I.—March 8, 1872.

722.—GOVERNOR FOR STEAM-ENGINES.—J. B. Duff, Patchogue, N. Y.—March 8, 1872.

732.—MACHINE FOR ROLLING METAL.—A. Johnson, New York City.—March 9, 1872.

733.—SHOE-BURNISHING MACHINE.—S. H. Hodges, Boston, Mass.—March 9, 1872.

The Hartford Steam-boiler Inspection and Insurance Co.

THE Hartford Steam-boiler Inspection and Insurance Company makes the following report of its inspections in the month of February, 1872:

During the month, 745 visits were made, and 1,534 boilers examined, 1,443 externally and 370 internally, while 194 were tested by hydraulic pressure. The number of defects in all discovered, 794; of which 198 were regarded as dangerous. The defects in detail were as follows:—Furnaces out of shape, 34—4 dangerous. Fractures, 79—39 dangerous. Burned plates, 53—29 dangerous. Blistered plates, 96—12 dangerous. Sediment and deposit, 111—9 dangerous. Incrustation and scale, 130—4 dangerous. External corrosion, 54—16 dangerous. Internal corrosion, 20—6 dangerous. Internal grooving, 23—3 dangerous. Water-gauges defective, 29—12 dangerous. Blow-out defective, 13—4 dangerous. Safety-valves overloaded and out of order, 24—12 dangerous. Pressure-gauges defective, 104—19 dangerous, varying from —6 to +12. Boilers without gauges, 3—2 dangerous. Deficiency of water, 9—9 dangerous. Braces and stays loose and broken, 24—15 dangerous. Boilers condemned, 7. There are many cases of glaring neglect reported, showing not only a great want of attention on the part of those having charge of boilers, but on the part of owners and users as well. If some responsible person would give a few moments' attention each day to the boilers and boiler connections, many disasters would no doubt be prevented. Among the instances of carelessness met with are the following:—A safety-valve leaking badly, instead of being repaired, was found with a plank laid across the lever, loaded down with bricks—300 pounds pressure would probably not have been sufficient to raise this valve. In another case, where the boiler was in a building with a flat roof, the safety-valve lever was found wedged under one of the rafters; this was regarded as an economical arrangement, "because it saved steam"!! We might fill a page with similar instances, but enough has been said to show that destructive accidents need not be attributed to mysterious agencies.

THE *Atlantic Monthly* has discovered that, if the milk product of the country could be devoted to paying the national debt, it would square the account in five years.

THE earthquake on the Pacific coast, March 26, opened fissures on the eastern base of the Sierras near Big Pine Camp, from fifty to one hundred feet wide, twenty feet deep, and several miles in length. It likewise tumbled down all the buildings at Camp Independence, Inyo County, Cal.

PROSPECTUS

OF THE

AMERICAN ARTISAN.

VOL. XIV. NEW SERIES. 1872.

Each number of the ***AMERICAN ARTISAN*** contains ***sixteen pages*** of instructive and interesting reading matter, in which the progress of the Arts and Sciences is recorded in familiar language, divested of dry technicalities and abstruse words and phrases. In this journal is published regularly the ***Official List*** of all ***Patents*** issued weekly from the United States Patent Office. Twenty-six numbers make a half-yearly volume of handsome and convenient size.

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In making application under the new law of 1870 for a United States Patent for an Invention, the first instalment of the Government fee is $15, which sum—together with fifty cents revenue stamp-tax on the power-of-attorney—*is payable in advance* on applying for the Patent, and $20 additional are due to the Government when the Letters-Patent are allowed. The agency fee charged by Messrs. BROWN, COOMBS & Co. is from $25 upward, according to the l bor involved, but in all cases their charges will be as moderate as possible for the preparation of drawings and all necessary documents. This fee is not payable until after the application has been prepared and the case is ready to be sent to Washington, and it includes all necessary services performed by Messrs. BROWN, COOMBS & Co. through their *Branch Office* in Washington, to secure the sp eedy and certain issue of the Patent.

Patents for Designs can be obtained at a less cost than Patents for Inventions, but these Patents only cover novelty of shape or configuration. They can be obtained for three and a half, seven, or fourteen years. The Government fees are payable in one sum in advance, and are $10 for three and a half years, $15 for seven years, and $30 for fourteen years. Messr . BROWN, COOMBS & Co.'s agency charges on Design Patents vary from $15 to $25. The Patent Office does not require models for Design Patents.

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No models are required for design-patents, and in other cases it is left to the discretion of the Commissioner of Patents whether he will require a model; but in order to enable the model to be dispensed with, the drawings require to be very full and plain, and the specification to be prepared with great care and skill, and it will be more than ever necessary that the inventor should employ a thoroughly competent attorney. Messrs. BROWN, COOMBS & Co. will, whenever desired, and if it is possible to do so, obtain the permission of the Commissioner of Patents to dispense with a model. This, in many cases, will save the inventor much trouble and expense in obtaining the patent; but we recommend, as a general rule, that a model should accompany the application. Models, when required, must be neatly and substantially made of hard wood or metal—or if of soft wood must be painted or varnished; they should not exceed one foot in any of their dimensions.

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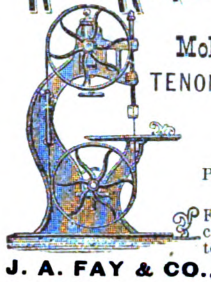

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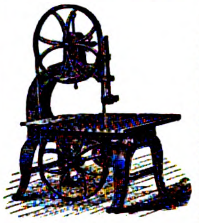

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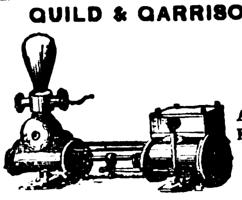

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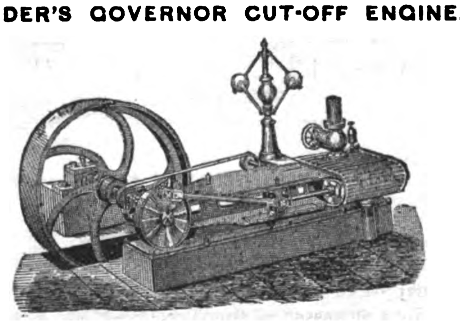

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A WEEKLY JOURNAL OF ARTS, MECHANICS, MANUFACTURES, ENGINEERING, CHEMISTRY, INVENTIONS, AND PATENTS.

VOLUME XIV. New Series. | NUMBER 16. | NEW YORK, APRIL 17, 1872. | $2 00 PER ANNUM IN ADVANCE. SINGLE COPIES, FIVE CENTS.

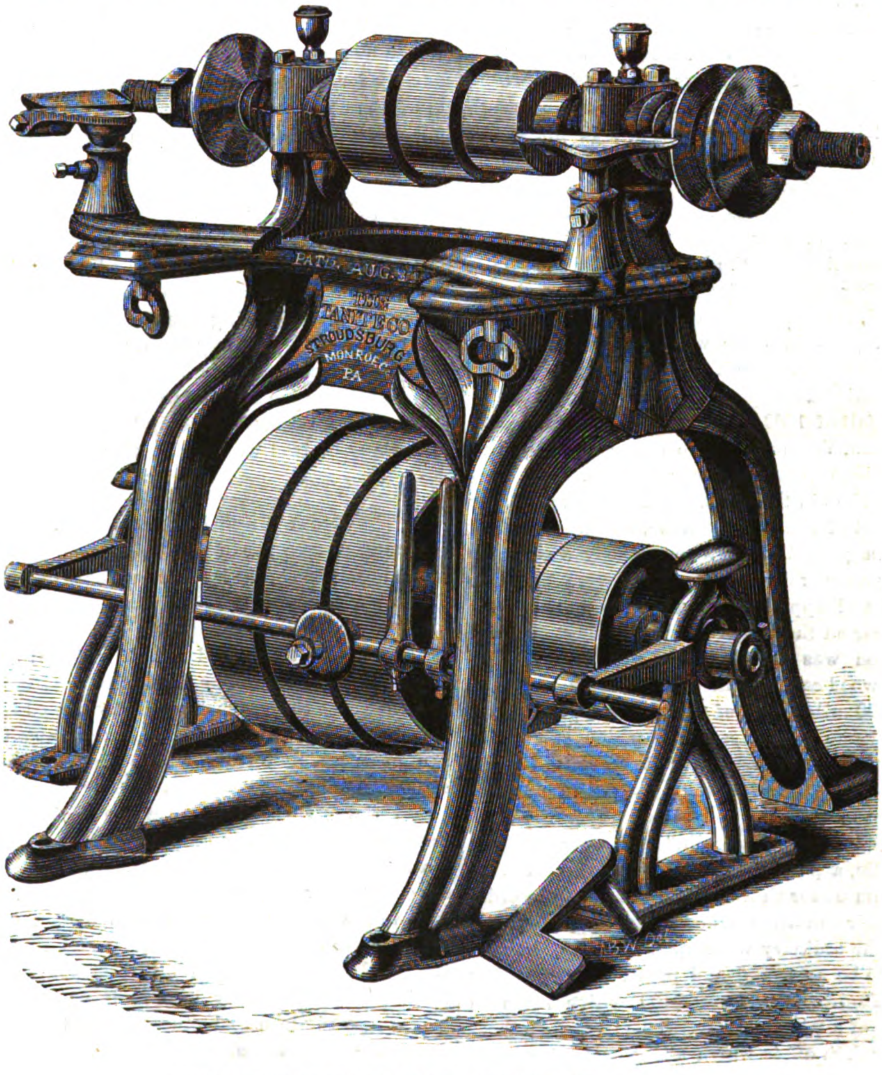
CONTENTS OF THIS NUMBER

[Illustrations are indicated by an asterisk.]

The Tanite Emery Grinder, No. 3.

WE herewith illustrate an improved tanite emery grinder, claimed by the manufacturers to be one of the most substantial and well constructed of any yet put on the market. The fault, say they, "of some machines of this class has been that they were made to stand too high, and had too narrow a base. Even this present machine of the Tanite Co.'s is an improvement on a former machine made by them; the new No. 3 standing about five inches lower, and spreading a foot wider at the base than the one first brought out. Many machines of the old pattern were sold, and gave great satisfaction, but the new is found far superior in actual practice. Where heavy wheels run at high speed—as all successful emery wheels must—there needs be some tremor and jar; and where wheels get out of balance the jumping is a serious detriment to the work, and is also dangerous. Hence the necessity of a *low* machine with a wide base. This machine has also the advantage that a belt can be attached from countershaft placed on ceiling of a lower floor, the opening through centre of machine being devised for that very purpose. While its cone-pulleys give appropriate speeds to various-sized wheels, and admit of higher speeds as diameter of wheels decrease through use, yet the machine is heavy, and solid enough to run wheels of the largest size. Machinists and manufacturers scarcely yet realize the advantage of using large wheels. There is as much waste material to a 12-inch wheel as to a 24-inch. Hence economy in the larger wheels. Large wheels, say 18 to 24 inches diameter, offer special advantages in the facility they offer for grinding flat surfaces *true* by using the sides of wheel instead of the face. By a little practice an expert mechanic can fit flat surfaces to each other so closely that the planer would not have done nicer work, while the side of the tanite emery wheel will do it, we are informed, in one-twentieth the time required by the planer. Moreover, the side of a 24-inch wheel presents a large, true, flat cutting surface, the *face* of wheel cutting only on a line. Not only can the feet of tables and small machines be leveled on the sides of such wheels, but large pieces, such as columns, girders, shafts, etc., of architectural, bridge, and foundry work, can be trued up on them. They are just the machine for iron bridge builders, architectural iron works, stove foundries, plow factories, etc."

The same manufacturers (the Tanite Company, Stroudsburg, Pa.) have also just brought out a special rest, devised for stone work, which reaches like a platform quite across the front of the machine, and extends beyond both wheels. This is not shown in cut, but is here incidentally mentioned as possessed of much merit for the special class of work indicated.



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Paper Car-wheels.

We extract the following concerning paper car-wheels from an article by W. E. Partridge in the *Car Builder*:—

"With the constantly increasing weight of cars and high rates of speed, has come a constantly increasing appreciation of the value of springs in protecting the rolling-stock from wear as well as the passengers from unpleasant vibrations and jars. But no matter how carefully the springs are adjusted, two vital points of the car, namely, the trucks, remain unprotected, while at the same time they sustain the whole load. The question was raised long ago as to whether we could get springs under the entire load. The answer was, yes; put them into the wheels, and then even the axles will be to a certain extent protected from the injury of pounding and jarring. For years various plans have been suggested for putting elastic materials into the wheels. Iron tires with wooden centers have been used to a considerable extent. They are, however, subject to several very serious defects, which, in this country at least, impair their value. Rubber promises well, and so does steel, but thus far the expected results therefrom have not been realized. . . . In the construction of the approved "paper" car-wheel,

the tire is of steel, and, when turned up ready for the filling, is made taper inside, so that the inside diameter on the flange is one-eighth of an inch smaller than on the other. The body of the wheel is a paper block made of straw-board, cut into circles thirty inches in diameter, pasted together with ordinary paste, and consolidated under a hydraulic pressure of about three hundred tuns. This block, after being slowly dried for nearly two weeks in a dry-house, is turned and fitted in a common pattern lathe. The turning-tool is like that used for iron, but the speed is about the same as is used for brass. This block, thus turned to fit the tire, is of course somewhat larger, in order to insure a perfect fit. A hydraulic pressure of about four hundred tuns is then used to force the block into its place. The tire is heated nearly to the boiling point of water, thus insuring a perfect bearing when cool.

When the paper block is in the lathe, a suitable hole for a cast-iron hub is bored through the center. This hub has a wide flange upon one end. Covering the whole of each side of the wheel are two side-plates of Norway iron boiler plate, which fit against a shoulder turned in the tire. The hub is forced in after these plates are in place, the flange, on its outer end of course, holding the outside plate firmly in its place. Sixteen bolts in the outer edge of the plates run directly through the paper, and hold everything fast; eight bolts go through the flange of the hub, securing the whole, and making the wheel, so far as its interior is concerned, water-proof. The paper itself is painted before it goes into the wheel, and is perfectly secure against dampness, even if the wheel were not water-tight.

In the fall of 1869, the writer of this article was in Brandon, Vermont, where he accidentally had his attention directed to some peculiar car-wheels in a little shop in the outskirts of the town. They were a part of the first lot made, and were looked upon with great distrust by everybody who knew anything about railroading. They were taken to Rutland, and application made to have them put under a car on the Rutland and Burlington Road. Permission was reluctantly given to try them under a wood-car, and in that position they ran about 5,000 miles, part of the time carrying a load of twenty-one tuns at a speed which sometimes reached thirty miles an hour. After standing this test, the whole lot of wheels, twelve in number were sent to Chicago, and placed under the Pullman sleeping-car "Dacotah." After running a good while, a pair of these original wheels were taken from under that car, and broken up in order to test their condition, when it was found that, excepting the ordinary wear upon the tire, they appeared to be as sound and perfect as when first made. Their cost is about $100, which includes the price of a $42 steel tire. This tire, when worn out and taken off, is worth about half-price to re-roll, while the remainder of the wheel would be in a sound condition, and able to wear out another tire with perfect safety. The writer is informed that the manufacturers of these wheels have a large contract to supply them for the Pullman palace, drawing-room, and sleeping cars, which, owing to their weight, render an elastic wheel exceedingly desirable—or, perhaps, to state it more accurately, a wheel which "deadens the jar."

Prevention of Fire on Cars.—The Illinois Central Railroad Company have ordered two hundred Babcock Fire-extinguishers, and propose supplying each passenger train with them, and also the depots along the line.

Copper and Mercury in Iron Ships.

The danger of allowing copper or mercury in any form to come near the bottoms of iron ships has been shown very clearly by the results of recent investigations into the causes of some of our most serious maritime disasters. For example, the Peruvian steamer *Calderon* sprang a leak and foundered in the Bay of Biscay, a short time ago, without any apparent cause. An inquiry was immediately instituted, and the conclusion reached is, that the leak resulted from a powerful local corrosion caused by the spilling of mercury from the gauge-cocks into the bilge, where, by lodging under the boilers and becoming oxydized with strong hot brine from the boiler leaks and sulphurated bilge water, it was converted into oxychloride of mercury. This subtle agent would quickly eat a hole through any portion of an iron plate from which the cement or paint had been accidentally scraped or worn away; and it is generally believed that, in the case of the *Calderon*, the leak resulted from this cause. It has also been demonstrated by experiments which any one who chooses may try for himself with but little trouble, that, under the circumstances above described, a copper bolt would be nearly as bad. In the recent investigation into the circumstances connected with the loss of the British iron-clad *Megæra*, it was shown in evidence that the washing about of a copper nail in the bilge of the iron steamer *Grappler* destroyed one of her plates, and nearly caused her to founder. These facts are of the greatest importance, as showing the danger of allowing copper or mercury, in any form, to come near the bottoms of iron ships and boilers, since, when exposed to the action of salt water, these metals become oxychlorides, and quickly destroy everything in the way of iron with which they come in contact.—*Iron Age*.

Great English Wire-works.

A correspondent of the *Telegrapher* gives the following sketch of the large wire-works of Richard Johnson & Nephew, in Manchester, England :—

"The works are situated in the township of Bradford, about one and a half miles from the city of Manchester. The first thing to attract our attention was the extensive colliery owned by the Messrs. Johnson, occupying in extent about five square miles, and from which they derive the enormous supply of coal used in their works. This location was selected because the coal obtained here is more free from sulphur than in any other locality available, and in this it possesses a great advantage for the manufacture of wire. The wire-works proper cover an area of six square acres. A branch of the Lancashire and Yorkshire Railroad, connecting with all railroads in England, runs immediately into their works, which brings the pig-iron and other material, and takes away the wire when completed. Upon entering their yard we are shown an immense stock of pig-iron; the average quantity which they carry being about five thousand (5,000) tuns, in the selection of which great care is exercised. Five thousand tuns of No. 9 wire would be equal to 30,000 miles. Our attention was next called to the puddling furnaces, of which there are twenty-five now in operation, and more are soon to be added. The iron, after careful puddling, is placed under immense trip-hammers, where each ball, containing several pigs, receives *five hundred to one thousand strokes*, until it is hammered into a block 4 inches square. The block is then rolled into a band about 13 feet in length. A portion of the bars are rolled into 5 inch by ¾ inch, and others into 3 inch by ¾ inch; these are then cut up into lengths of about 20 inches. Four of the 5-inch bars are formed into a box containing the same number of the smaller ones; together these are heated and rolled into bars of 20 feet. These bars, after careful selection, are reheated in one of Siemens's furnaces; a workman grasps the bar with a pair of tongs, runs it through the furnace, and then into Bedson's patent continuous rolling machine at white heat, through fifteen pairs of rolls, each roller reducing the size of the rod until it emerges from the last, a No. 4, 5, 6, 7, or 8 wire, as may be desired, making a continuous length of about ⅓ of a mile without a single joint or weld. This is the operation by which we are supplied with the great lengths peculiar to Messrs. Johnsons' wire. Mr. G. Bedson, the patentee, is the manager of these works. By this process the lengths may be made almost without limits; but those mentioned, it will readily be seen, are as great as would be required for telegraph purposes. In this machine the wire was rolled for the great Niagara Suspension Bridge, as also for the bridge over the Ohio River at Cincinnati—the length of the wires in the former being upwards of 800 yards each, No. 9 gauge.

"The rods after cooling are removed to cleaning vats, where, after being perfectly cleansed, they are dried and then drawn through steel dies to any desired size. After being jointed (and here the celebrated American joint is used) the wire is taken to the galvanizing works, where it is passed through the furnace into the cleansing bath, thence to the zinc bath, receiving its coating of spelter, from which it is wound into coils ready for use: thus passing through the annealing, cleansing, and galvanizing in one continuous process peculiar to these works. I may here remark that this establishment is able to produce a coil of galvanized wire from the pig-iron in the space of 15 hours, which no other works in England can do in less than 2½ days.

"Each coil of wire is then passed through the hands of an inspector, who thoroughly examines it, and each end is subjected to a test much more severe than it receives in its erection. Another test is applied by a machine which at once exhibits the tensile strength of the wire and its capacity of elongation. The firm have furnished the British postal telegraph nearly forty thousand miles of wire during the past two years. In the manufacture each separate process has its stationary engine, of which there are not less than thirty employed, ranging from 4 to 400 horse-power. The variety of tools, machinery, and implements in use here is astonishing and beyond description. Among other things, we find an American pointing machine for pointing the ends of the wire."

APPLICATIONS FOR EXTENSIONS.

Opponents of extensions must file *written* objections in the Patent Office at least 20 days before the day-of-hearing: and on that day, at noon, they must appear personally, or by proxy, at the Patent Office, and state the reasons of their opposition. All testimony—*pro* or *con*—must be taken and transmitted in accordance with the official rules, which will be furnished on application. The under-named patentees have recently petitioned for extensions (for seven years) of patents granted to them in the year 1858 :—

Hezekiah B. Smith, Smithville, N. J.—*Arrangement of Devices for planing Moldings.*—Patented July 6, 1858; testimony will close on June 4, next; last day for filing arguments and examiner's report, June 14; day-of-hearing, June 19.

Henry Yates, Brantford, Ontario, Canada.—*Furnaces of Steam boilers.*—Patented July 6, 1858; testimony will close on June 4, next; last day for filing arguments and examiner's report, June 14; day-of-hearing, June 19.

Lyman R. Blake, Brooklyn, N. Y.—*Sewing-machine.*—Patented July 6, 1858; testimony will close on June 4, next; last day for filing arguments and examiner's report, June 14; day-of-hearing, June 19.

Compressed-air Engines.

THE plan of working tramway-cars or other vehicles by turning to account the power stored up in a supply of compressed air is one which has been frequently proposed, and which has, in several instances, been carried out in practice with results in some cases satisfactory, and in others of a decidedly opposite kind. In America, in particular, this system of propulsion has attracted much attention, and we, from time to time, receive from the United States reports of the more or less successful trials of various modes of carrying out the system in practice. It unfortunately happens, however, that the data available concerning these trials are generally of the vaguest possible kind. They inform us, perhaps, that a car fitted up with a compressed-air engine made such and such trip in such and such a time, and that the performance was successful, or that it failed in some way or other; but we are doubtful if any really complete series of experiments has ever been made with one of these engines, or at all events we are unaware of a report of any such experiments having been published. By a complete series of experiments on a compressed-air engine, we mean a trial, or a series of trials, of the engine on the line of which the gradients are known, and with a load also known, there being taken during the run or runs a continuous series of indicator diagrams from the cylinders, and contemporaneous observations of the temperatures and pressures of the air in the reservoir, and in the pipe leading to the cylinder, besides a record of the temperature of the air as it is discharged from the cylinder into the atmosphere. The barometric pressure and the temperature of the external air, and the amount of moisture present, should also be noted, while a record might also be kept of the temperatures of the external surfaces of the reservoir, of the pipes communicating with the cylinders, and of the cylinders themselves.

From such a series of observations as that to which we have alluded, some valuable data might be deduced bearing upon the construction of pneumatic locomotives, and we believe that a great deal of the time and money at present spent in so-called practical experiments might be saved. It would be possible, for example, to deduce from such observations information respecting the rates at which the air during expansion took up heat from objects with which it was in contact, and to determine the extent to which the heat converted into work was replaced by other heat absorbed by external sources. These data being obtained, it would become possible to determine approximately the best proportions between the initial and working pressures of the air used (for in most cases the pressure of the air is materially reduced on its way from the reservoir to the cylinders), the best cylinder capacity to employ for a given amount of work to be performed, and the best place to make up, or try to make up, the loss of heat due to work done. The determination of these points, even approximately, would be of immense service to those who are endeavoring to bring pneumatic propulsion into use, and instead of working in the dark, as at present most, if not all, of them appear to be doing, we should earnestly recommend them to carry out such trials as those of which we have spoken. If they were to do so, we feel certain that the cause in the progress of which they are interested would be most materially benefited.

From the time that the system of working engines by compressed air was first proposed down to the present, one of the most annoying practical difficulties with which the advocates of the system have had to struggle has been the excessive refrigeration caused by the expansion of the air, and the consequent freezing of the moisture contained in it; this freezing resulting in the blocking up of the pipes and passages with ice. To avoid this trouble, it has been proposed to heat the air on its way to the cylinders by passing it through pipes inclosed in a stove or furnace, or to envelop the cylinders in jackets through which the products of combustion of a stove might be made to circulate; while, in the case of the submarine boats built at St. Petersburg some time ago for the Russian Government, and which are driven by engines worked by compressed air, the plan was resorted to of connecting the engines with the reservoirs by a number of pipes, and shutting off the current of air through any of those pipes in which ice might accumulate, so that the latter might be thawed by the absorption of heat from external sources. In some cases upwards of thirty pipes were used to connect the engine with the reservoir of air. This plan of employing a number of connecting pipes no doubt meets a portion of the difficulty; but it is a plan requiring more attention than it is desirable should have to be bestowed on the working of engines fitted to tramway-cars, while the proposals to heat the air on its way to the cylinders, by passing it through tubes exposed to the fire of a stove or furnace, or to heat the cylinders by means of jackets traversed by products of combustion, are also open to objection on practical grounds. Amongst other things, there is, if either of these latter plans be resorted to, always a risk of giving to the air, prior to its admission, or to the cylinder itself, such a temperature as to destroy the lubricating material employed, and thus cause "cutting" to take place.

Having objected to the principal plans proposed for obviating the difficulties resulting from the refrigeration of the air during expansion, it is only fair that we should point out what we believe to be a preferable mode of getting over these difficulties. This mode consists simply in the employment of a hot-water jacket for both the cylinders and reservoir, and in the adoption of a sufficiently slow piston speed. The water-jacket may consist simply of a tank well lagged externally, and sufficiently large to contain the air reservoir, the connecting pipes, and the cylinders; or, if preferred, the reservoir and the cylinders may be inclosed in independent jackets or tanks, it being merely necessary to take care that each jacket contains a sufficient supply of hot water to furnish the heat required of it during the run. It may, at first thought, be supposed that the quantity of water required to supply this heat would be so great as to render the plan proposed an impracticable one. So far from this being the case, however, the quantity required is remarkably small, as we shall show on a future occasion, when we treat of the question in greater detail; and we may remark here that, for running a 6-tun car for three miles over a fair ordinary road, the quantity of hot water required for the jackets would be but about twenty gallons only, it being supposed that this quantity is renewed by a fresh supply at a temperature of 200°, or reheated, say, by blowing steam to it, at the commencement of each trip. In some cases where a stove is employed to warm the car, the heat from this stove could be turned to account for maintaining the temperature of the jacket water.

We have mentioned that, in addition to using hot-water jackets, it appears to us desirable that a slow piston speed should be adopted for compressed-air engines, and we may explain briefly why we hold this opinion—an opinion which may, perhaps, be opposed to the experience of some who have worked such engines without jacketed cylinders. Let us, for instance, consider the case of an engine in which the air, stored up at a high pressure in a main reservoir, is led thence, through a reducing valve, to an intermediate receiver, in which it is maintained at a constant pressure, while from this receiver it passes to the cylinder, and is cut off in the latter at, say, one-third the stroke. In such an arrangement, the work expended in the intermediate receiver in supplying air to the cylinder is balanced by that developed by the entrance of the air from the main reservoir, and under these circumstances the intermediate receiver is exposed to neither a loss nor gain of heat, so long as the air flowing into it from the main reservoir is maintained at a constant temperature. The work done during the first third of each stroke prior to the valve closing the admission port, is really done by the expansion of the air in the main reservoir, and it is to that reservoir, consequently, that the heat must be supplied if the air flowing to the cylinder is to be maintained at a constant temperature. With a hot-water jacket there need be no difficulty in adopting such a form of main reservoir as will enable this required amount of heat to be communicated to the contained air with certainty. After the point of cut-off is passed, however, the work done in the cylinder during each stroke is performed by the expansion of air contained in the cylinder, and this expansion is, of course, accompanied by a refrigerating effect. To prevent the temperature of the air in the cylinder falling too low during this expansion, it is desirable to supply heat from external sources while that expansion is taking place. But air takes up heat but slowly from the surfaces with which it is in contact, and hence, that the heating to which we have referred may be successfully performed, it is necessary either to envelop the cylinder in a jacket of which the contents are kept at a high temperature, or to employ such a slow piston speed that time is given for the absorption of heat from a jacket of which the contents are but moderately heated. For several practical reasons we prefer the latter alternative, and hence it is that we advocate slow piston speeds for compressed-air engines. What the best piston speed may be it is impossible at present to say, as data for arguing the question properly are wanting; but we consider that there is evidence available to show that this speed is much lower than has hitherto been generally adopted for such engines, and we believe that the matter is one which has not hitherto received the attention which its importance deserves. Air, it must be remembered, possesses very different qualities to steam, and the arguments in favor of high piston speeds for steam-engines certainly do not apply to motors worked by compressed air.

We have now directed attention to some of the leading points connected with the system of working engines by compressed air; but we have very far from exhausted the subject. There are said to be more ways of killing a dog than hanging him, and it is equally true that there are more ways of getting rid of the trouble arising from frozen moisture in the class of engines of which we have been speaking than that of jacketing the reservoir and cylinders. A consideration of these methods, however, we must leave for a future article, when we shall also have something to say of the system from a quantitative point of view; or, in other words, shall speak of the amount of compressed air which it is necessary to carry to perform a given amount of work, and shall probably treat of the efficiency of the system as a whole.—*Engineering*.

Essentials of Brick Making.

IN Germany 7 men mold in a day 10,000 bricks. Near Paris, 4 men make 7,000 bricks in 12 hours.

In the London brick-field, 4 men and 3 boys constitute a "stool." Of these, only one is at the mold, the others are engaged in bringing the clay from the pug-mill (driven by one horse per stool) and in carrying off and stacking the bricks. 7,000 bricks per day of 12 hours is considered good work for one stool. This labor is paid about $1 25 per 1,000.

In Westphalia, an iron mold is fastened to a table; an iron piston, connected with a lever worked easily by the molder's foot, empties the contents of the mold upon a board. The brick is carried off between two boards, and set up on edge to dry. One man molds 3,000 per day. The German bricks are larger than the French or Dutch.

In France an iron mold with hinged sides is used; it makes a smooth brick, as the mold is opened sidewise and is never drawn off.

When the brick is molded close to the lower opening of the pug-mill and wheeled off on a track, one molder, with two men to fill the pug-mill, one man to rough-shape and hand him the clay, and one man to wheel off the molded bricks, can make and stack 3,500 German bricks per day. If the clay is worked too stiff, the bricks may look better, but are less homogeneous and durable. In England the clay is worked in a more plastic state than in Germany.

Machines have to compete with the preceding elements of hand-molding.

The advantage of machine over hand labor may be considered fully established in all departments of brick-making, except digging the clay and molding the brick; the latter seems the only debatable operation.

Meagre clays and those requiring much working up are better adapted to machine work.

Bricks made from fat and mixed clays seem more apt to crack when machine-made.

The relative merits of machine and hand make are not settled. Resistance to crushing has been investigated and found equal, by a Bavarian Commission, and in favor of the machine, by an English Commission. In point of economy, the following are obstacles to molding by machinery:

1st. A stationary machine requires excessive transportation of raw and finished material.

2d. Interest, and sometimes wages, on machinery idle six months. Also repairs.

3d. Some 15 per cent. more raw material is required, if bricks are denser, as often occurs.

4. Protection from unequal wind and sun in drying is indispensable.

With a large production and a well-chosen machine, these difficulties are overcome.—*Beckwith's Report on Pottery.*

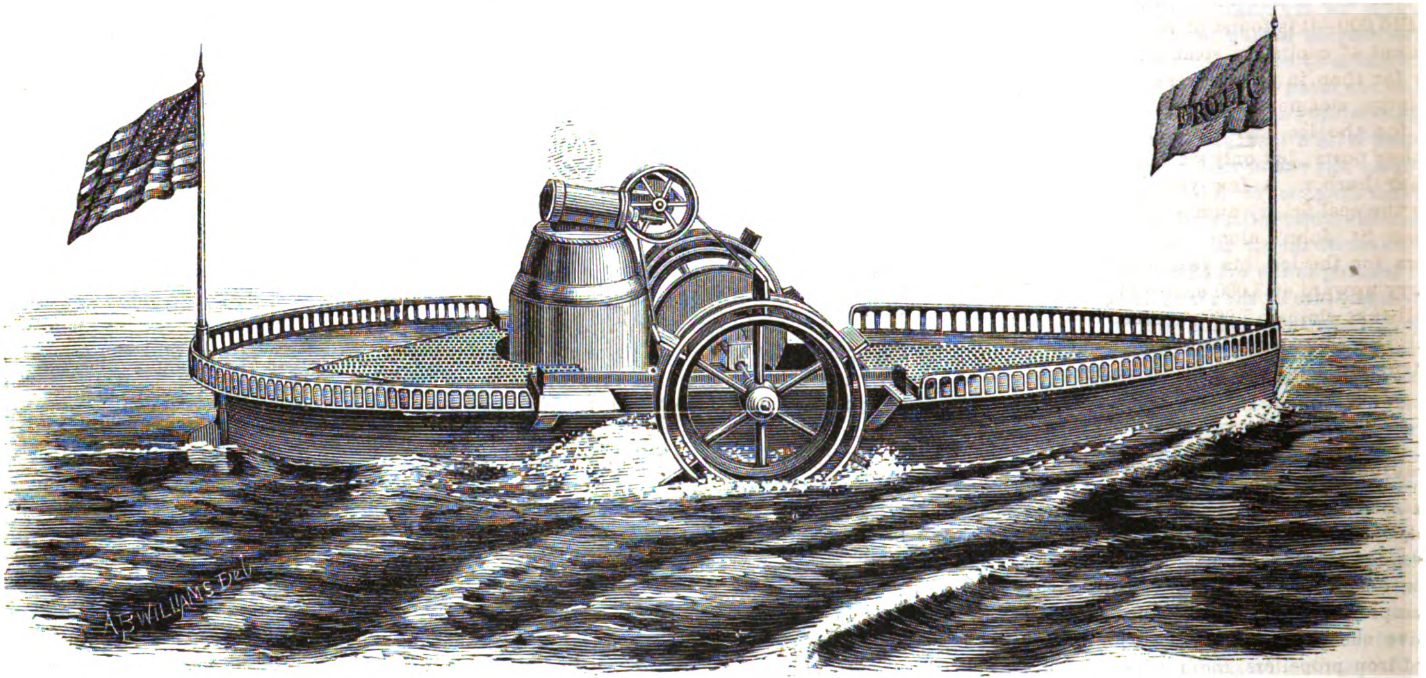
Buckman's Patent Toy Steamboat.

THERE can scarcely be a more useful class of toys than that including those designed to familiarize children with the scientific and mechanical principles on which so much of the active business and so many of the practical pursuits of life are founded. It is to this class that the toy herewith illustrated belongs. It is a miniature steam-vessel propelled by a toy steam-engine, and with paddle-wheels adjustable in such wise that their dip in the water can be regulated to suit the burden that may be placed upon the craft. It is the invention of Alexander Buckman, of Brooklyn, N. Y., who has taken steps through the "American Artisan Patent Agency," to secure its novel features by letters-patent. It is manufactured by the Buckman Manufacturing Company, whose store is at 634 Broadway, New York City, and who, devoting special attention to steam toy-mechanism, are securing a praiseworthy prominence in this branch of manufacture.

The hull of the vessel is of sheet-metal and appropriately shaped; the paddle-wheels being arranged, as is commonly the case with steamboats, at the sides of the boat, with the shaft extending transversely amidships.

This shaft has its bearings in a bed made movable in a vertical direction. and so fitted with springs pressing against it that the frictional pressure will retain such bed at any part of the guide in which it is placed. This, of course, enables the adjustment of the wheels to be readily made by simply taking hold of the ends of the shaft with the fingers, and bringing it to the desired position. The shaft is furnished with a pulley or band-wheel connected by a belt with a pulley above. This last is driven by the crank and pitman of a direct-acting steam-cylinder, mounted upon the top of the boiler, which is heated, as is usual with toy steam-engines, by a lamp placed underneath. It will thus be seen that by very simple means motion is transmitted to the paddle-wheels, which, properly adjusted as just explained, propel the boat when placed on the water.

In order to permit air to pass readily to the flame of the lamp used for heating the boiler, the deck, like the hull of sheet-metal, is perforated, this also providing against any undue heating of the hull by the lamp, which might under other conditions affect the solder by which the ports of the hull are secured together. The engraving being intended to show the arrangement of the several essential portions, a case or covering applied on the engine is not represented, but the toy complete is provided with such an adjunct shaped and fitted to imitate the central portions, above deck, of an ordinary steamer, and, being provided with a smoke-stack, etc., renders the resemblance to the actual craft more close.



BUCKMAN'S PATENT TOY STEAMBOAT.

This Year's Arctic Expedition.

THE *Weser Zeitung* gives a detailed description of the steamer now building at Bremerhaven, to be used for the Arctic expedition, projected for this summer by the Austrian explorers, MM. Payer and Weyprecht, and designed according to their special directions. The ship is to bear the name of *Tegetthoff*, in memory of the Austrian admiral. The length of the vessel is 118 feet; its breadth, 25¼ feet; its depth, 13½ feet; and its tunnage, 150 Bremen lasts. The engines are gauged at 95 horse-power; their consumption of coal is three tuns in twenty-four hours, and the ship holds fifty days' supply, besides coal for three years' heating and cooking. Its speed is six knots an hour.

Seal Hunting by Steam.

A Newfoundland correspondent of the Boston *Traveller* writes that great preparations are in progress at St. John's for the annual seal-hunt. As the time draws near for the vessels to start, streets and wharves assume an appearance of bustle and animation. The steamers and sailing vessels begin to take in stores and complete their repairs. The competition is great, for far more men present themselves than can possibly obtain berths. The great anxiety now is to get a place on board one of the steamers, the chance of success being considered much better in them than on board a sailing vessel. The masters of the steamers are thus able to make up their crews of picked men—young, hardy, stalwart fellows, well fitted to cope with the hardships, privations, and perils of such a voyage. Each steamer has on board from 150 to 200 men.

Steamers can make two or three trips to the ice-fields each season, and "walk round" the antiquated sealer that is dependent on the wind. Although the cost of a steamer is heavy—from £10,-000 to £15,000—it is found of late years that the investment of capital in steamers is more profitable by far than in sailing vessels. This year a dozen large steamers will leave the port of St. John's for the ice, and six additional steamers from other ports; but only six sailing vessels will leave our harbor. A few years ago, our sailing fleet for the seal fishery numbered 120 sailing vessels from St. John's alone. The entire fleet of steamers for the ice this year numbers 18, and will carry upward of 3,000 men. The sailing vessels will take close on 7,000; so that 10,000 hunters will, in a short time, be engaged in the work of destruction, amid the floating ice-fields of the North.

Sheathing Iron Steamers with Wood.

Anomalous as it may seem, when the world has virtually yielded the palm of superiority to iron over wooden vessels, as regards durability, etc., we now hear rumors that iron vessels, especially those employed on the great lakes, are receiving protective sheathings of wood. The large and splendid iron propellers, *India*, *China*, and *Japan*, of Evans & Co.'s Atlantic, Duluth, and Pacific line, plying between Buffalo and Duluth, we hear, are now receiving sheathings of wood to their hulls below the deep-water line. We also learn that the Canadian ex-blockade runner, iron side-wheel steamer *Chicora*, on the route between Collingwood and Fort William, is also being sheathed in a similar manner.

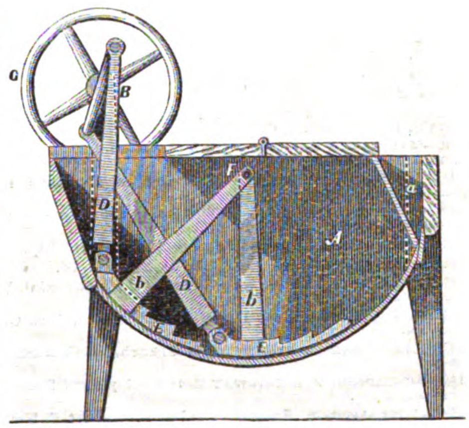
The reason of this is, that touching at so many ports where the entrance to the harbor is through a narrow, rock-bound channel, there is much danger of striking a jagged point or the loose boulders on the bottom. In either case, there is danger of puncturing a hole through the unyielding iron plates, which cannot be easily stopped or repaired without going into dry-dock. Wooden vessels, however, frequently strike even harder without receiving serious injury, the wood of the hulls being sufficiently elastic to receive the shock without the breakage of the shell sufficient to admit water, or so little as not to injure the cargo, nor require dry-docking, the damage being repaired from the inside, or a liberal use of pitch or oakum.

It is expected that this sheathing of wood over the iron plates of the hulls, while it will not interfere with the speed nor increase the draught of the steamers, will afford great protection from minor collisions with rocky sides and bottoms of the narrows and shallows through and over which the vessels are obliged to pass in their meanderings from port to port.—*Marquette Mining Journal.*

KEY'S PATENT WASHING MACHINE.

Our engraving, a vertical transverse section, represents an improved washing machine, patented through the "American Artisan Patent Agency," March 26, 1872, by John Key, of Union City, Randolph County, Ind.

The general contour of the tub, A, is indicated in the cut, the bottom being of inverted arched form, and made of zinc or other suitable material. The ends of the tube are straight, and at one is a partition shutting off a small space, *a*, to permit the facile attachment of a wringer when desired. The legs at one end of the tub extend above the top thereof, and have bearings in their upper extremities for a double-cranked shaft, B, carrying a balance-wheel, G, itself furnished with a crank-pin or wrist, whereby the working parts of the apparatus are actuated. Each of the cranks on the shaft, B, actuates one of the rubbers, E,



through the agency of a connecting rod, D. The rubbers are each made wide enough to extend nearly one-half the width of the bottom of the tub, and are formed with longitudinal slits, and are notched or shouldered on their upper surfaces as clearly indicated in the engraving. They have rigidly attached to them the arms, *b*, pivoted, at F, to a cross-shaft in such manner that the rubbers, when in motion, swing in a path corresponding to the curvature of the bottom of the tub. It will be seen that the rotation of the crank-shaft, B, gives a vibratory movement, alternately in opposite directions, to the rubbers, E. This works the cloths or fabrics to be cleaned repeatedly over and over, alternately expressing the water from them and allowing them to again absorb it, thereby securing the expulsion of the impurities therefrom.

Tubular Way through the East River.

A bill now before Congress proposes the laying of a tube of wrought-iron, 2,660 feet in length, 60 feet in breadth in the clear, and 24 feet high, at a cost of $2,500,000, to facilitate travel between the cities named by accommodating foot-passengers, vehicles, and railroads. The bill authorizes the collection of 1 cent for foot passengers, 3 cents a head for cattle and horses, 5 cents for saddle-horse and rider, 6 cents for single wagon and horse, 12 cents for double wagon and horses, 18 cents for each cart, and 24 cents for loaded double wagons. The tube to be so laid in the bed of the river as not to obstruct or interfere with navigation.

Surface Electricity.

It is well known that Faraday made numerous experiments upon this subject, and has varied, under different forms, that which Coulomb has realized with the hollow sphere and its two covers. It is still under this form, the least commodious, that this experiment is repeated in the lecture-room.

If the loss is considerable on the day when this experiment is performed, it ceases to be sufficiently conclusive; for it requires, first, to electrify the sphere alone; second, to recover it rapidly with its two covers; third, to take them off; fourth, to prove that these covers are electrified; and, fifth, that the sphere is not. The second operation cannot be executed with great rapidity on account of the form of the covers.

Amongst other experiments, Faraday has made the following:—He took a cylinder made of metallic gauze placed upon an insulated horizontal metallic disk, the design being to afford proof that the exterior is alone electrified. An animal, such as a mouse, placed in the interior, showed no commotion, even when the whole apparatus was electrified so strongly that bright sparks might be obtained from it.

Faraday did more, he constructed a cubical chamber 12 feet on each side, with laths, the walls were of wire gauze and of paper, and the whole chamber was suspended by means of silken ropes. The chamber, even the interior, could be electrified strongly on connecting it with an electric machine. Faraday inclosed himself in this chamber with electroscopes and various other apparatus, but he failed to find the least trace of electricity, whilst the walls were so strongly electrified that vivid sparks were obtained from the outside, and "brushes" escaped spontaneously.

M. Terquem has endeavored to repeat this experiment in his lectures, on a small scale, in the following manner:—He took any form of bird-cage, whether of wood and iron wire, or entirely of metal, and suspended it to some isolated conductor in communication with the electric machine. Inside the cage was placed a gold-leaf electroscope, and also pieces of tinsel, the feather of a quill, and pith balls. Whilst it was possible to obtain vivid sparks from the cage, nothing moved in the interior. Within the cage was suspended a bundle of linen yarn, and underneath the cage a similar bundle; the interior bundle remained undisturbed, whilst the exterior was greatly excited and electrified, all the bits of yarn spreading out, and on approaching the hand the peculiar crackling due to electricity was heard.

Bands of paper being stuck along the length of the wires of the cage, the exterior bands would twist strongly, and get displaced, whilst the interior remained vertical and unmoved when the cage was electrified. To complete the experiment, a bird might be placed inside the cage, and by his singing and general demeanor prove that he was not only completely indifferent to the phenomenon of electrical charge and discharge, but that behaving so proved that the interior of the cage was perfectly free from all electrical phenomena, whilst the exterior alone was susceptible to the electrical influences.—*Engineering.*

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For the Week ending April 9, 1872,

AND EACH BEARING THAT DATE.

[Reported officially for the "American Artisan."]

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125,562.—CAR-COUPLING.—Perry G. Gardiner, New York City.

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125,566.—THRASHING-MACHINE REEL.—Hugh Hanna, Pittsburg, Pa.

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125,584.—PRINTING-TELEGRAPH.—George Little, Rutherford Park, N. J.

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125,599.—MACHINERY FOR MAKING INDIA-RUBBER FLANGED TUBING.—Thomas Jefferson Mayall, Boston, Mass.

125,600.—PREPARING EMERY VULCANITE OR HARD RUBBER COMPOUNDS.—Thomas J. Mayall, Boston, Mass.

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125,604.—SCABBARD-FROG.—Henry Metcalfe, New York City.

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125,606.—POST OFFICE LETTER-CASE.—Allen F. Miller, Galva, Ill.

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125,609.—WASHING MACHINE.—Daniel W. Norris, Normal, and David M. Cole, Elgin, Ill.; said Norris assignor to the said David M. Cole.

125,610.—PRESS FOR EMBOSSING LINEN AND OTHER FABRICS.—Leverett H. Olmsted, New York City.

125,611.—RAILWAY-SWITCH.—John Jay Pardee, New York City.

125,612.—GRAIN-METER.—Henry Pooley, Thomas Roberts, and Eugene O'Brien, assignors to Henry Pooley & Son, Liverpool, England.

125,613.—TREATING PHOSPHATES OF LIME FOR THE MANUFACTURE OF FERTILIZERS.—Nathaniel A. Pratt, Charleston, S. C.

125,614.—MILITARY BRASS INSTRUMENT.—Benjamin F. Quinby, Boston, Mass.

125,615.—STAIR-ROD.—Emil Rath, Hoboken, N. J., assignor to Moritz Krikl, New York City.

125,616.—MACHINE FOR BORING HUBS.—John L. Roberts and Roswell K. Daily, Waverly, Iowa.

125,617.—CARPENTER'S ADJUSTABLE BEVEL.—Isaiah J. Robinson and Henry Fairbanks, St. Johnsbury, Vt.

125,618.—CUTTER-HEAD.—Edwin A. Rowley, assignor to Millspaugh, Rowley & Millspaugh, Williamsport, Pa.

125,619.—EXTENSION-TUBE FOR CHANDELIERS.—Edwin Russell, Waterbury, Conn.

125,620.—BREECH-LOADING FIREARM.—Heinrich Aug. Schesch, Ilion, N. Y.

125,621.—FURNACE FOR SMELTING ORES.—Theophilus L. R. Scheuner, Salt Lake City, Utah Ter. Ante-dated April 3, 1872.

125,622.—LOCK FOR CAN-COVERS.—Henry W. Shepard, New York City.

125,623.—LOCK FOR CAN-COVERS.—Henry W. Sheperd, New York City.

125,624.—ELECTRO-MAGNETIC WATCHMAN'S REGISTER.—Horatio D. Sheppard, New York City.

125,625.—VISE.—Anson P. Stephens, assignor to A. P. and M. Stephens & Co., Brooklyn, N. Y.

125,626.—WAGON-STANDARD SUPPORT.—George Stiber, Crogan Station, Pa.

125,627.—EARTH COMMODE.—George F. Stone, Baltimore, Md.

125,628.—SURGICAL AND FRESH-WOUND LINIMENT.—John S. Stratton, Newfane, Vt.

125,629.—MACHINE FOR MAKING SPIKES.—James H. Swett, Pittsburg, Pa.

125,630.—TOOTH-FASTENING FOR HORSE-RAKES.—Benjamin C. Taylor, Dayton, Ohio.

125,631.—TRACE-BUCKLE.—William S. Thayer, Smithsborough, N. Y.

125,632.—MANUFACTURE OF CANDLES.—John K. Truax, Pittsburg, Pa.

125,633.—MANUFACTURE OF ILLUMINATING GAS.—Peter H. Van der Weyde, New York City.

125,634.—FIRE-EXTINGUISHER.—Jacob B. Van Dyne, Louisville, Ky.

125,635.—APPARATUS FOR THE TREATMENT OF LIQUIDS WITH NITRIC ACID.—Carl W. Volney, Boston, Mass.

125,636.—BRICK PRESS.—William Wakely, Taunton, Mass. Ante-dated March 27, 1872.

125,637.—THILL-COUPLING.—William W. Wallis, assignor to himself and William F. Blackiston, Philadelphia, Pa. Ante-dated March 26, 1872.

125,638.—MACHINE FOR CUTTING CLOTH.—Alvin Warth, Stapleton, N. Y.

125,639.—RELIEF-VALVE FOR AIR-BRAKE CYLINDERS.—Thomas W. Welsh, assignor to Ralph Bagaley, Pittsburg, Pa.

125,640.—GUN-LOCK.—Franklin Wesson, Worcester, Mass.

125,641.—SPITTOON.—Jerome W. Wetmore, assignor to Nathaniel Murphy, Erie, Pa. Ante-dated March 27, 1872.

125,642.—BIT-BRACE.—Charles Whitus, assignor to himself, Edward C. Smith, and William Martin, Jun., Philadelphia, Pa.

125,643.—BILLIARD-CUE.—Oliver C. Wilbur, Jun., Coventry, R. I. Ante-dated April 3, 1872.

125,644.—BUTTER-MOLD.—Daniel G. Williams, Quincy, Mich.

125,645.—PROCESS AND APPARATUS FOR FORMING MASH.—Fred. William Wolf, Chicago, Ill.

125,646.—YEAST FOR BREWERS AND OTHERS.—Joseph Wolff, Chicago, Ill.

125,647.—SAW MILL.—Martin Woodard and John E. Snyder, Missouri Valley, Iowa.

125,648.—RAILWAY RAIL.—James A. Woodbury, Boston, Mass.

125,649.—RAILWAY-CAR WHEEL.—James A. Woodbury, Boston, Mass.

125,650.—TEMPERING STEEL RAILROAD RAILS.—James A. Woodbury, Boston, Mass.

125,651.—TEMPERING THE TREADS OF CAR-WHEELS.—James A. Woodbury, Boston, Mass.

125,652.—LEADER-HOOK.—Chauncey D. Woodruff, Toledo, Ohio.

125,653.—BEDSTEAD.—John P. Zeller, South Bend, Ind.

125,654.—APPARATUS FOR DISSOLVING SUGAR.—William Hocking, New York City.

RE-ISSUES.

4,853.—FANNING MILL.—Greville E. Clarke, assignor to Zalmon G. Simmons, Kenosha, Wis. Patent No. 112,687, dated March 14, 1871.

4,854.—MACHINE FOR MIXING SOAP AND OTHER MATERIALS.—Charles Ebling, Cleveland, Ohio. Patent No. 119,018, dated Sept. 19, 1871.

4,855.—AUTOMATIC FIRE-EXTINGUISHER.—Rufus Lapham, assignor, by mesne-assignments, to Paul P. Todd, New York City. Patent No. 65,682, dated June 11, 1867.

4,856.—MACHINE FOR MOLDING EARTHEN PIPE.—Peter McIntyre, Norwich, Conn. Patent No. 97,668, dated Dec. 7, 1869.

4,857.—CONNECTING CARRIAGE-SPRINGS.—John A. Topliff and George H. Ely, Elyria, Ohio. Patent No. 122,079, dated Dec. 19, 1871.

4,858.—FASTENING FOR CORSETS.—Morris P. Bray, New Haven, assignor of one-half his interest to The Shelton and Osborn Manufacturing Company, Derby, Conn. Patent No. 100,970, dated March 22, 1870.

4,859.—SPRING-SEAT FOR HARVESTERS.—Thomas Brett, Geneva, Ohio. Patent No. 124,113, dated Feb. 27, 1872.

4,860.—COMPOUND FOR CLEANING CARPETS, ETC.—Leo Marks Cincinnati, Ohio, assignor to Louis Stern, Boston, Mass. Patent No. 110,181, Dated Dec. 27, 1870.

4,861.—ADJUSTABLE METALLIC DASH FOR VEHICLES.—George M. Peters, Columbus, Ohio. Patent No. 102,315, dated April 26, 1870; reissue No. 4,408, dated May 30, 1871.

4,862.—ROOFING FABRIC.—Alfred Robinson, New York City, assignor to Ready Roofing Company. Patent No. 44,220, dated Sept. 13, 1864.

4,863.—AGRICULTURAL BOILER.—Ebenezer E. Sill and Alonzo, H. Bennett, Rochester, N. Y.; A. H. Bennett assigns to Ebenezer E. Sill. Patent No. 109,679, dated Nov. 29, 1870.

4,864.—PAPER-FILE.—Eldridge J. Smith and Benjamin H. Cheever, Washington, D. C., assignor by mesne assignments, to Eldridge J. Smith. Patent No. 76,834, dated April 14, 1868.

4,865.—PROVIDING PROJECTIONS FOR KETTLES AND THE ATTACHMENTS OF BAILS.—David Stuart, Philadelphia, Pa. Patent No. 119,666, dated Oct. 3, 1871.

4,866.—PLOW-SHARE.—Richard Henry Taylor, Lincoln, Va. Design No. 4,521, dated Dec. 13, 1870.

4,867.—MACHINE FOR HOT-PRESSING TEXTILE FABRICS.—Richard Renner Wilson, Halifax, England, assignor, by mesne assignments, to John J. Crawford. Patent No. 41,801, dated March 1, 1864.

DESIGNS.

5,752 to 5,756.—CARPET-PATTERN.—Joseph Barrett, New York City, assignor to the Parks Carpet Company, Palmer, Mass.

5,757.—WATCH KEY OR CHARM.—John Goldsborough, Philadelphia, Pa.

5,758.—OPEN-GRATE STOVE.—Joseph Hackett, Louisville, Ky.

5,759.—TYPE.—Carl E. Heyer, West Roxbury, Mass.

5,760 and 5,761.—OIL-CLOTH PATTERN.—Henry Kagy, assignor to Thomas Potter, Son & Co., Philadelphia, Pa.

5,762.—DRAWER-PULL.—John M. Maris, Philadelphia, Pa.

5,763.—HAND-STAMP.—William E. Osborn, Brooklyn, N. Y.

5,764 and 5,765.—CARPET-PATTERN.—William R. Parks, assignor to the Parks & Wade Carpet Company, Palmer, Mass.

5,766.—DOOR-LATCH.—Adolph Wunder, assignor to Sargent & Co., New Haven, Conn.

TRADE-MARKS.

737.—PLUMBAGO OR GRAPHITE LUBRICANT.—American Graphite Company, New York City.

738.—SEWING-SILK AND MACHINE-TWIST.—Calhoun, Robbins & Co., New York City.

739.—LIQUORS.—Cazade & Crooks, New York City.

740.—MULEY-SAW HANGINGS.—William S. Colwell, Alleghany, Pa.

741 to 743.—WHISKY.—M. R. Cook & Co., New York City.

744.—SUSPENDERS.—Fisk, Clark & Flagg, New York City.

745.—MEDICINE.—Hall & Alger, Taunton, Mass.

746.—MEDICINE.—Nathaniel Jenkins, New Orleans, La.

747.—FLOUR.—McCutcheon, Gordon & Co., Sparta, Ill.

748.—SNUFF.—Alexander Ralph, Philadelphia, Pa.

749 to 751.—MOWING, REAPING, AND HARVESTING TOOLS.—The Greenwoods Scythe Company, New Hartford, Conn.

755.—CUTLERY.—Frederick Ward & Co., Sheffield, England.

756 to 758.—MEDICINE.—Cochran Fleming, Sewickley, Pa.

759 to 762.—CORSETS.—Ottenheimer, Rothschild & Company, New York City.

763.—DRY GOODS.—A. T. Stewart & Company, New York City.

764.—PREPARATION OF COD-LIVER OIL.—Edward H. Truex, New York City.

EXTENSIONS.

19,819.—LIGHTNING-CONDUCTOR.—Oren White (and Henry C. Janes, assignee). March 30, 1858.

19,787.—WINDLASS.—Joseph P. Manton. March 30, 1858.

19,747.—WIRE STAPLE.—Byron Boardman. March 30, 1858; reissued March 6, 1866, No. 2,183.

19,786.—LATHE-CHUCK.—John L. Mason. March 30, 1858.

19,806.—ROTARY CUTTER FOR TONGUING AND GROOVING.—James A. Woodbury, March 30, 1858.

Letter Box

A. S. M., OF PA.—You ask whether some method cannot be devised for promoting the production of some grain more nutritious than rice, and capable of taking its place. There can be no doubt that any cereal may be improved to almost an indefinite extent by selecting the best for sowing, and continuing the practice through a long series of years. Rice, however, is one of the most nutritious of grains, containing, if our memory of chemical data serves us rightly, more phosphoric acid in proportion to its weight than any other of the cereals.

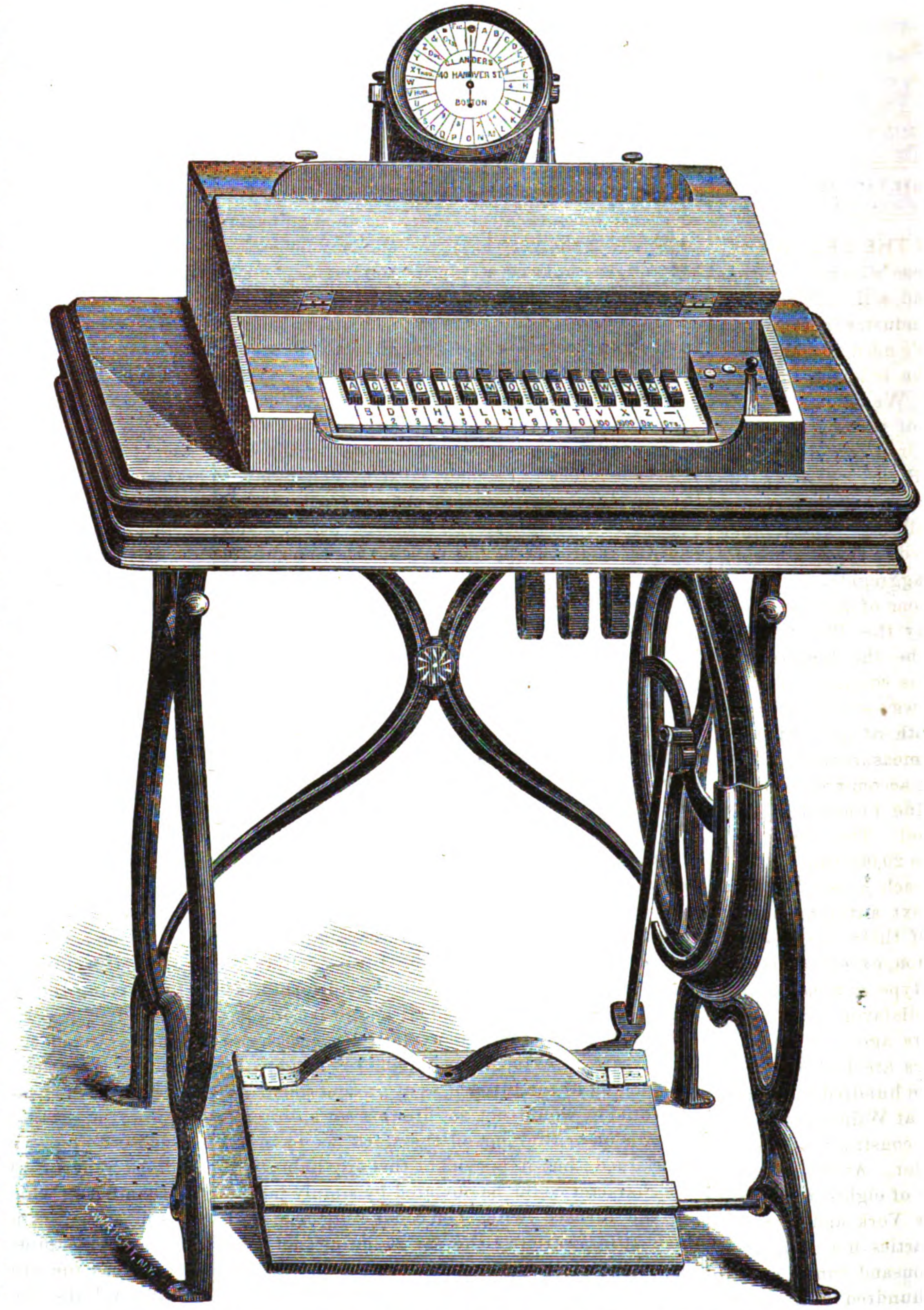
E. L., OF MAINE.—The deepest excavation in *sand* that we can recall is one stated to have been made in the construction of an English railway, and one hundred and ten feet in depth. The device you mention of retaining walls sustained by iron beams or by arches extending across the roadway at a height sufficient to clear the engines, is an old and somewhat favorite one with civil engineers.

G. T., OF ILL.—We should not consider twenty-two pounds an excessive weight for a cast-iron railway chair, but, judging from your sketch, you will find but little difference in making your device of wrought metal and of much less weight.

Anders's Magnetic Dial Telegraph Instrument.

OUR engraving represents an improvement in that class of telegraphic devices known as "dial" instruments, and in which communications are indicated letter by letter through the agency of a rapidly revolving index hand or pointer, arranged in proper relation to a dial, and stopping for an instant as each letter to be designated is reached. Dial instruments are of two kinds, the one variety being actuated by ordinary voltaic electricity, while the other is worked by magneto-electric currents, derived or applied through the agency of permanent magnets. The invention now especially under consideration is of the character last indicated, and is the invention of Mr. George L. Anders, and is manufactured by the firm of George L. Anders & Co., 40 Hanover Street, Boston, Mass., who furnish the following, having reference to their improvements, and which will make the essential features of the apparatus intelligible to telegraph men:—

"The apparatus is designed to combine the valuable characteristics of the well-known A B C instrument of Wheatstone and the dial apparatus of Siemens & Holske, of Berlin, and at the same time to avoid some objections incident to the use of both the others. By the employment of a generator of unusual power is avoided the necessity of extreme delicacy and lightness in the construction of the moving parts of the indicator, which has been an objection in most other instruments, while at the same time the manufacturers are enabled to increase the size of the dial. An incidental advantage of this fact is that the apparatus is much less sensitive to atmospheric influences, as well as less liable to derangement from accidental contact of the line wire with other telegraph wires conveying the current of powerful batteries.



ANDERS'S MAGNETIC DIAL TELEGRAPH INSTRUMENT.

The general appearance of the apparatus is shown in the engraving. A portion of the magneto inductor is seen projecting below the table at the left of the fly-wheel. When transmitting, the fly-wheel and inductor are rotated by means of the treadle, and the words spelt out by the successive manipulation of the keys upon the key-board. At the top of the instrument is seen the indicator, the pointer upon which indicates the letters in the manner previously referred to. No acid battery is required with the instrument—all the electricity required being generated simply by the revolution of the inductor by means of the treadle. The whole apparatus occupies no more space than an ordinary sewing-machine.

These instruments have been for some time in use on the police telegraph lines in Boston, as well as by a considerable number of manufacturing and other private establishments, and have given entire satisfaction. Some of the parties using them say that they have succeeded in transmitting communications at the rate of thirty words per minute, and it is probable that even this rate could be considerably exceeded by a thoroughly skilled operator.

Each instrument is provided with a signal bell, for giving notice when a communication is to be transmitted.

Experience shows that this instrument will work well and rapidly either on long or short lines, and a number can be operated on the same wire. They are therefore adapted to railroad and police telegraphs as well as to private lines.

Foreign Reward to an American Inventor.

IT is stated that an agreement has been entered into between Mr. Danks, the inventor of the new puddling machine, and a combination of iron manufacturers representing the different districts, whereby the latter undertake to have two hundred furnaces on his plan put up within six months, and, in consideration of his permission to do so, to pay him £50,000 at that time, whether the furnaces are in operation or not. In most cases this will represent an extension of the puddling power, seeing that the general body of the firms are not going to remove their old hand-puddling furnaces, and this will be equal to an additional make of 300,000 tuns per annum. It is intended, on payment of a further sum, to erect two hundred and sixty more, and this, with the forty before arranged for, will make something like four hundred and fifty furnaces added to the producing power of the country in a year or two. This is such a revolution as has never before occurred in the history of this branch of industry, and the more is it to be wondered at when it is remembered that, till July last, it was thought that hand-puddling must for ever continue, every machine to do away with it having, before that, entirely failed.—*The Engineer.*

Too much Legislation.

UNDER such a law in Massachusetts, providing for the inspection of fish, all packages of fish are restricted to a weight of two hundred pounds. A capitalist of Boston desired to construct tanks in platform cars, and to send them to San Francisco filled with mackerel, bringing them back filled with salmon, which are so abundant on the western coast. As the "packages" in this case, however, would weigh two thousand pounds, the enterprise would be illegal, and it was abandoned. State fish-inspectors, in the meantime, are making about $4,000 a year.

Two log-huts were recently uncovered in the rear of Sullivan Street, New York City, by workmen making excavations for a new foundation. They were of large logs of yellow pine in a good state of preservation, and were buried when the place was filled in many years ago.

THE SUEZ CANAL.—The original estimate as to the cost of the Suez Canal amounted to only £5,200,000, while the total expenditure of capital to the close of last year was £17,312,315.

AMERICAN ARTISAN

BROWN, COOMBS & CO., Publishers.
ISSUED WEEKLY AT
No. 189 Broadway, New York.
S. T. BROWN. J. W. COOMBS.

AGENTS.

AMERICAN NEWS COMPANY.................New York City
NEW YORK NEWS COMPANY.................do
NEW ENGLAND NEWS COMPANY.................Boston.
A. WINCH & Co.................Philadelphia.
H. TAYLOR & Co.................Baltimore.

WEDNESDAY, APRIL 17, 1872

IRON SHIP-BUILDING ON THE DELAWARE.

WE have never been of those who believe that American ship-building is dead, although the disadvantages under which the industry labors are as plain to us as to others. We need not here enumerate the reasons that have led us to this conclusion or sustained us in it. We purpose simply to mention the proof given of the soundness of our views by the progress of iron steamship construction on the Delaware River, where, in the neighborhood of Philadelphia, no less than twelve steamers are in process of building. These range in burden from fifteen hundred to three thousand five hundred tuns, and their aggregate cost is considerably more than six millions of dollars. Four of them, to be controlled by the Pennsylvania Railroad, will, it is stated, be the largest iron ships ever constructed in this country. The dimensions are given as follows:—"Length each, 355 feet; beam, 43 feet; depth of hold, 34 feet decks, 3; tunnage, freight measurement, 3,500; weight, 3,000. There will be accommodations for seventy-six first-class and nine hundred second-class passengers on each vessel. The cost will be $550,000 each. There will be 20,000 tuns of iron used in the construction of each vessel." Three of these are to be finished next autumn, and the fourth in January, 1873. Of their engines, etc., we have no definite information, except that they will be of the compound type now so rapidly coming into use, despite the disfavor with which it was regarded a few years ago. In addition to these steamers, eight others are building; two of them (of two thousand five hundred tuns each) by the Pacific Mail Company at Wilmington. The same company is also having constructed another of the same burden at Chester. At Wilmington also, are building one steamer of eighteen hundred tuns for a line between New York and New Orleans, and two others for parties not named; at Chester, another of two thousand tuns; and at Philadelphia, one of fifteen hundred tuns. These are to be A1 at Lloyd's, and of course claimed as equal to those of foreign build. The ship-builders who, in the face of existing obstacles, thus undertake to put the construction of iron steam-vessels upon a permanent footing will doubtless receive their reward in possessing every facility afforded by experience and wide reputation in that day, which is sure to come, when this industry will be one of the most important in the United States.

NEEDED—A NEW MACHINE.

ALL familiar with farming know that deterioration in crops is a direct result of the use of poor seed. If the grain sown is light, it is so because of deficiency in the starch and other substances from which each plant must derive its nourishment until the green leaves appear and the root fibrils are sufficiently developed to extract nutriment from the soil. The difference between light and heavy seed for sowing is, therefore, precisely the difference between a thrifty and strong growth and one that is spindling and thin. Those farmers understood this who, years ago, followed and advocated the plan of striking the sheaves against a post to rattle off the ripest and, consequently, the most heavy kernels for seeding purposes. But this method is too slow for the present period, and too frequently grain no better than that ordinarily fed to cattle and horses is relied upon as the basis of the future crop. Hence there is not that gradual improvement in the quality of grain that would otherwise follow in the course of years, and hence, also, the desirability of some apparatus by which the very best kernels may be sifted out from the bulk of a crop for the purpose mentioned. Such a machine ought not to be difficult of production, and there is no good reason why a device constructed on the general plan of a centrifugal ore-separator should not answer every purpose. To separate heavy kernels of grain from light ones can hardly be more difficult than to remove heavy particles of ore from lighter ones of crushed rock. To meet with extended favor from practical agriculturists, the apparatus would have to be so simple as to be easily operated and kept in repair, and should be sold at a moderate price. To careful and thrifty farmers such a machine ought to pay its cost in a single year, even if not more than thirty acres of oats, wheat, or barley were sown, while with a larger acreage the profit would of course be proportionally more. And with these hints we leave the subject to inventors whose business it is to supply every need that arts and industries ask in the diminution of labor or in the increase of the products thereof.

CAR HEATING.

THE cars of the Harlem and New Haven Railroad are heated by hot-water pipes, through which a constant circulation is maintained by a suitable arrangement of them with reference to the furnace in the car. There seems little fault to be found with this plan as far as the uniform heating of the car is concerned, although it is doubtless more costly than many railroad companies would care to extensively adopt. Whether the overturning of the furnace, as at present constructed, would or would not set fire to a car splintered by collision or running off the track, we have not ascertained; but it is evident that any liability of this character could be obviated by simply jacketing the furnace with non-conducting material, the heat for warming the car radiating not from the furnace itself, but from the pipes. Where travel is great, as in the immediate vicinity of cities, this system has merits that entitle it to adoption.

But the greater cheapness of stoves will recommend them, on many lines, to preference over any other heating appliances, however well these may accomplish the specific object for which they are designed. Stoves must, however, be made safe, or legislation—if public opinion should prove insufficient—should drive them out of use, as it aims (not always with success) to prohibit dangerous boilers on steam-vessels. Many safety stoves have been devised, and as far as concerns the automatic and immediate extinguishment of the fire in them in case of accident, more than one can justly claim to be eminently successful. But a stream of carbonic acid or a douche of water that will subserve this purpose will fail to reduce the temperature of a red-hot stove below the point at which its contact will set fire to materials ordinarily combustible. This may have been provided against in some device, but if such exists it has not been brought to our notice. We are aware that sheet-iron jackets have been applied for the purpose, but are doubtful of their utility, inasmuch as they would be likely to be crushed hard against the hot sides of the fire-box in the very contingencies in which the utility of any appliance of the kind should be most manifest. The desideratum should not be difficult of attainment, and, once discovered and applied, will add essentially to the practical worth of a large class of apparatus not yet very favorably appreciated by railroad men, but possessing a fair chance of adoption i once made approximately perfect.

BLEACHING BY SULPHUROUS ACID GAS.

THE uses of steam, aside from the production of motive power, are manifold, and not least among them are those in which the fluid acts as a mechanical agent for the transfer of others, liquid or gaseous. Of these the Giffard injector is perhaps the most notable example, but other applications of the same principle are not only of considerable popular interest, but also of much practical industrial value. For instance, some years since, M. Baslaert employed a steam-jet to throw upon the fibers, in the form of a steady and continuous spray, the alkalies used in the treatment of hemp and flax for textile uses. By this means, a more intimate action of the agent upon the material was obtained, and superior results produced. More recently the same projector has introduced in the silk and woolen manufactories of Roubaix and St. Denis a modification of the same method; a steam-jet being used as the vehicle by which sulphurous acid gas is applied in the bleaching of fabrics. This process costs more than does the old or common one, but by it the time required is reduced from twelve hours to three. In other words, in this respect a saving of seventy-five per cent. is obtained, and the work of the establishment is rendered capable of more speedy and energetic prosecution.

In carrying the process into effect, the sulphur is placed in a peculiarly formed receiver, placed on the grate of a suitable furnace, the latter so arranged that the air, coming in at openings in the sides of the ash-pit, unites with the sulphur to form the gas, and then passes to an uptake, closed at the top, but having a perforated pipe extending transversely through it, and leading to the chamber in which are suspended the articles to be bleached. A jet of steam projected through the transverse pipe draws with it, through the perforations, the sulphurous gas, and conveys it to and through the fibers of the fabrics or tissues to be bleached. Reasoning *à priori*, this method seems capable of very advantageous application in many cases where the old chafing-dish of burning sulphur thrust into the receptacle containing the material to be bleached has hitherto been thought sufficient.

FRENCH HORSE-SHOE MAKING.

THE manufacture of horse-shoes of old and accepted patterns has kept far in advance of any improvement in this class of devices as concerns their form, attachment to the hoof, or means of holding firm upon the roadway traveled on, all of these points susceptible of advantageous change. According to the *Chronique de l'Industrie*, the

methods of production employed in the fabrication of horse-shoes for the French cavalry, and also for the omnibus lines in Paris, are noteworthy for their simplicity. The machinery is described as comprising a rolling-mill, a shaping-machine, two steam hammers, and two punching machines, with, of course, dies for each size of shoe made; the value of all this is said not to exceed £1,600. The hammers require 15-horse steam power, and a 6-horse engine suffices for all the rest; but, it is added, a 15-horse engine would probably answer all purposes. With the above machines the company turns out 2,000 shoes a day, with six laborers and three apprentices, and the space occupied by the factory is about four hundred square meters. The production is constant; when working only during the day, the fires are covered up at night, but when working night and day, there is, of course, a considerable economy of fuel and working expenses. The engines are worked with the lost heat of the plate furnace, as in rolling-mills.

STEAM CANAL TOWAGE.

BY D. D. WILLIAMSON, MECHANICAL ENGINEER.*

(Concluded from page 227.)

WITH reference (thirdly) to cable towage, known in this country as the Belgian system from being in use in the swift running current of the river Meuse, in Belgium, two steel wire-ropes require to be laid in the bottom of the canal and through its entire length. A tug containing a steam-winding engine, fitted with one of Fowler's clip-drums and with friction and guide pulleys, picks up the wire cable, and thus pulls itself along, dropping the slack of the cable overboard as it leaves the clips. This clip-drum is a pulley containing a large number of small metal clips, which form a groove and are movable. Its action in closing upon and holding the rope is somewhat like the movement of the fingers of the hand. The guide and friction pulleys bend the wire-rope and present it in the best position for the clip-drum, and also take care of the "slack" after it leaves the clips.

An actual trial has been made with this system, a single wire-rope having been laid between Albany and Troy. A tug built expressly for the trial, it is stated, towed three loaded boats at a speed of three miles per hour.

A prospectus has been issued by the projectors of this system, and the first item in their estimate will probably prove fatal to its adoption. The bare cost of the wire-rope for the Erie Canal is $1,400,000, which means *one and a half million dollars* when laid and ready for use. This sum, added to their estimate of 100 tugs at $10,000 each, represents a capital of $2,500,000 in "plant," which is, of course, independent of the working capital. A second and most serious objection, but which is not mentioned in their prospectus, is the great "wear and tear" and consequent depreciation of the clips and wire-rope. Hundreds of these same clip-drums have been used on Fowler's steam-plows in England, and so great was the complaint as to their rapid wear that a Committee of the Royal Agricultural Society investigated the matter, and reported that the destruction of clips and wire-rope averaged the sum of nine pence sterling (eighteen cents in gold) per acre of land plowed. As the duty and freight on steel wire-rope is 50 per cent., such a destruction presents a formidable objection to its use in this country.

* Paper read before the New York Society of Practical Engineering, March 13, 1872.

The deterioration of wire-rope after it commences to wear is rapid and certain.

For overcoming swift currents, as in going around falls, this system is employed to advantage in Europe, but when used, as on the river Seine, between Paris and Havre, it failed to show the expected economy, and a portion of the cable has been taken up and sold.

4. *Towing by the direct traction of road steamers on the tow-path, and known in Albany as the "Williamson" system.*—By this system it is claimed that a Williamson road steamer will haul three first-class boats, fully loaded, at double the present speed, at half the cost, without injury to the tow-path or the canal, and without the least alteration of the boats. The width and height of three steamers are such that they will pass each other in the present tow-path, and go under any of the bridges.

A public trial of this system was made between Troy and Albany, in May, 1871, in the presence of several engineers and others, who pronounced it a perfect success. The specialty of this road steamer consists in the use of india-rubber tires upon the driving-wheels. The weight of the engine, together with the draught on the tow-line, collapses or flattens these elastic tires so as to bring a large section of the circumference of the drivers in contact with the tow-path, thereby increasing the adhesion so as to prevent slipping, and enabling the engine to resist the sidewise strain caused by the angle of draught. The tires, being 15 inches wide, act as veritable road-rollers, rolling the tow-path down smooth, and keeping it in good repair. They also act as the most perfect springs, saving the machinery from jarring, and thus reducing the wear and tear to a minimum. A flexible steel-plate armor protects the tires from wear, so that they will last as long as the engine itself.

At the trial, it was the intention to haul 4 boats, but owing to the serious break in the canal at Oxbow, but few loaded boats were coming down. After a delay of 24 hours, only two had been secured, but, as these were of the largest class and deeply laden, a start was made by simply unhitching the horses and putting the road steamer in their place. Without the slightest difficulty, the steamer towed these two boats from near Troy to Albany at more than twice the usual speed. The opinion was expressed by the canal engineers present, that the steamer was not half loaded, but could have towed 4 boats with ease. The same authorities decided that 3 boats would constitute the most convenient tow, both in regard to steering around sharp curves and in economizing time at the locks. The following night the road steamer ran from Troy to Albany on the main road, and through the streets of the latter city, at a speed of 9 miles per hour, steaming up on the deck of a barge for transportation to New York.

The practical working of a number of road steamers in different parts of the world during the past three years, enables a very close estimate to be made of their running expenses. The following figures will amply cover the cost of towing three first-class boats from Albany to Buffalo in 6 days:—

COST AND COMPARISON OF TOWAGE.

By the Williamson Road Steamer.

12 tuns of coal at $6 per tun	$72 00
2 engineers (12 days) at $2 50 per day	30 00
2 fireman (12 days) at $1 50 per day	18 00
Oil and grease at 50 cts. per day	3 00
Repairs at $1 per day	6 00
Interest on $5,000 at 7 per cent. for 7 months	10 00
Depreciation on $5,000 at 10 per cent. for 7 months	14 29
Towing 3 boats	$153 29
Towing 1 boat	$51 10

To make the comparison with horse towage add expenses of crew, etc., for 6 days at $12 03 per day	$72 18	
Interest on cargo for 6 days at 96 cts. per day	5 76	—$77 94
Cost of transportation by 1 boat by road steamer in 6 days		$129 04
Cost of transportation by 1 boat by animal power in 10 days		262 90
Saving per boat by use of road steamer 4 days and		$133 86

By the Belgian System.

The company estimate a tug to burn 2 tuns coal per day, and to make the trip in 6 days, at a running expense of $40 per day	$240 00
Add interest at 7 per cent., and depreciation 10 per cent. on cable and tugs for 6 days per tug	$121 42
	$361 42
Cost of running road steamer	$153 29
Saving of road steamer over cable towage	$208 13

By Propeller.

From the official report of the trips of the *Dawson*, it is evident that no economy was shown over animal towage, when taking into consideration the diminished cargo capacity of the steam-boat.

The mechanical principles and mode of construction of the road steamers is the same as that of railway locomotives. Their manufacture has been successfully established within a few miles of New York, and they can be produced in such quantities as to entirely equip the Erie Canal within one year.

No mention has been made of the plan proposed by many unthinking persons, of laying a railway track on each bank of the canal and towing by locomotives. A road steamer on the tow-path of the same weight and dimensions will pull much more than a locomotive on rails, owing to the greater adhesion of the drivers. As high speed is inadmissible, and the load to be drawn in both cases is on the water and not on the rails, the advantage would be with the road steamer, aside from the millions required to build the railway.

Cupro-Ammonium.

BEING called upon by various correspondents to give some account of this curious agent, certain applications of which we have stated in our columns, we willingly accede to the request the more readily, believing as we do that cupro-ammonium is destined to come out of the category of mere chemical curiosities and fill an important place in the conduct of practical operations.

First, then, what is cupro-ammonium? We will endeavor succinctly to explain. Addressing ourselves to practical people, we will be practical in our exemplifications, not designating cupro-ammonium by any formula, but acquainting those who wish to learn how it may be made, and, when made, what it is capable of effecting. To make cupro-ammonium, then, the following steps are necessary:—Procure some aqueous solution of ammonia of the highest strength known in commerce, which is that of ·880 specific gravity, water of course being taken at 1,000. Operating on a small scale, the operator will most probably desire nothing better for his vessel of capacity than a glass bottle for containing his ammonia and converting it into cupro-ammonium. On the large scale, glass bottles are no longer practicable, and, then, consideration must be given to the best material for supplementing it. Tin answers very well, also tin-plate and sheet-iron; lead, copper, zinc, and brass are all inapplicable.

However, to the extent of present remarks, we shall assume that the experimentalist uses glass. Let him, then, take a bottle about half full of ammonia solution, of gravity ·880, let him immerse some shreds of copper, and notice the result. Almost immediately the solution acquires a tinge of blue, which tinge can be referred to the solution of a portion of the copper, the question being, by what is the metal dissolved?

Air, or rather the oxygen of air, is necessary to

the result, as may be demonstrated by absolutely filling a bottle with solution of ammonia plus the copper shreds, instead of partially filling it, when no solution of the metal will issue.

It will be proper here to remark that, although ammonia will first precipitate hydrated oxyd of copper from any ordinary copper salt, and an excess of ammonia dissolve the oxyd, yielding a blue solution, yet the latter is not the cupro ammonium to which our remarks will refer, having none of the properties of that fluid save identity of color.

Reverting to the bottle holding shreds of copper, and partially filled with ammonia solution of sp. gr. ·880, it must now be stated that, although the incidence of chemical action is made evident to the eye at once, yet the maximum degree of chemical action will only be arrived at after the lapse of about six weeks, and not even then, except care has been taken to remove the stopper of the bottle from time to time, shaking the contents—still better, pouring the contents from one bottle to another—the general result arrived at being to give air. In practice, on the large scale, the same result is more speedily attained by means of an air force-pump. After the lapse of the requisite time, the solution will be found to have acquired a deep-blue color, and also certain very curious properties, amongst others, that of dissolving a number of things usually regarded as insoluble.

For example, cupro ammonium so rapidly dissolves silk that, when in good condition, a yard length of white Persian or sarsanet, if plunged into the solvent, disappears as readily as a lump of sugar in a tumbler of hot water. Lignine or cellulose dissolves also with great facility, but with a facility not quite equal to silk. Of all forms of lignine, perhaps, white blotting-paper dissolves most readily, but there is no form or variety of lignine which it will not dissolve under the condition of adequate time.

Taking advantage of this solvent property of the agent, a curious series of operations becomes possible. Paper, linen, wood, any sorts or varieties of lignine, may easily be agglutinized together, without the intervention of any other cement than its own substance brought to the state of solution by cupro ammonium. A curious fact, too, is that when surfaces of paper or other ligneous material have been thus agglutinated, the copper which they hold may be extracted by a weak acid, leaving the paper or other lignine pure and white, but not in any way interfering with the adhesion of one layer of lignine material to another.

The chemical inquirer need not be told that the designation cupro ammonium is only empirical. What the exact formularization of the substance may be the name does not express, and is not intended to express. That the copper exists in a peculiar electro-chemical state not participated by ordinary copper salts, is well demonstrated by difference of the action of the two on iron. For example, whereas sulphate of copper (blue vitriol), if dissolved, and iron immersed in the solution, deposits copper on the iron at expense of iron dissolved, the cupro ammonium does nothing of the sort, but actually guards the very brightest of iron and steel against all chemical action so long as immersion is continued. This reminds us of a reply to a naval surgeon who has sent us a letter, in which he asks whether cupro ammonium would protect his instruments against rust, to which they are subject between decks. The answer is yes; cupro ammonium will infallibly do that; but, we are sorry to say, will also dissolve all such parts of surgical instruments (*e.g.*, knife handles) as have ivory, wood, or bone entering into their composition.

These remarks on cupro ammonium comprise all that probably our various querists would desire to know. Following the instructions given, they will experience no trouble in making it. As to applications of it, we have reason to believe various important ones on a large scale will be seen before long.—*The Engineer.*

COMMUNICATIONS

TO CORRESPONDENTS.

We wish our readers to understand that, in freely publishing communications, we do not hold ourselves responsible for the opinions of our correspondents, inasmuch as we may occasionally publish views opposed to our own.

Action of Fulminating Powders.

MESSRS. EDITORS:—As "Machinist" from Tiffin, Ohio, is singling me out among our scientists to give an explanation of the reason of the great downward effect of fulminates, and as I have experimented in this line many years ago, I am ready to answer. I have had occasion to attach fulminates to a vertical wall on a little support, igniting from a distance with the electric spark; the whole power was apparently spent in a horizontal direction, toward the side of the wall; another time, I suspended a fulminate below the blade of a common table, and it knocked a hole in it upward, making the splinters fly like a kite; while once I placed a fulminate between two boards, and I found it smashed them equally.

The conclusion from this is what may be suspected *a priori*, that the destructive action of these fulminates is equally great in all directions, but as it cannot show itself in that direction in which there is nothing to destroy, therefore its effects manifest themselves downward when lying on a surface; any disturbance of the atoms of air or water restore themselves directly by their fluidity, while the disturbance of the atoms of solids is permanent, leaving fractured fragments behind, to testify as to the power which acted on them.

P. H. VAN DER WEYDE.

NEW YORK CITY, March 20, 1872.

MESSRS. EDITORS:—My attention is called to the inquiry of "Machinist" in the ARTISAN of Jan. 24, who says he has three troubles, although he names but two. I will endeavor to get him out of those. First, in silver-plating, if he will use a Smee battery with the zincs properly amalgamated, and the center plate thoroughly platinized, the proportion of battery to solution being one cell of one gallon capacity to fifteen gallons of depositing solution, and make his solution with free cyanide of potassium, with *enough* silver to make it rich, I will guarantee a *bright* deposit, which he says he could not get. To make his battery solution, let him take four ounces of sulphuric acid to a gallon of water. To make his precipitating or plating solution, take one lb. of free cyanide and one and a half ounces of silver to a gallon of water. The cyanide must be pure and white, and it is better to make it for himself, but if he cannot do that he must reject all the gray.

His second trouble was in covering a plaster bust with copper, the bust only covered where the moisture had accidentally removed the plumbago coating. The simple solution of this trouble is that he did not properly coat the plaster in the first instance, and the accident accomplished in spots what he had been too unskillful to accomplish intentionally. ORESTES CLEVELAND,

President Joseph Dixon Crucible Co.

JERSEY CITY, April 9, 1872.

Manufacture of Brushes by Machinery.

MESSRS. EDITORS:—I noticed an article in the AMERICAN ARTISAN in relation to a machine for manufacturing brushes invented by A. M. White. The writer of the article did not tell the whole story. Its sequel is that of many of the best inventions in the land. Capitalists have the invention, the inventor has yet to toil day by day to earn his daily bread. It is about time that inventors had some organization for protection against (shall I say?) piracy. A company is formed to buy a valuable invention, paying part cash, part in stock, run a little while, and fail, leaving the invention in their hands, and worthless stock to the inventor. W. L.

WATERBURY, CONN., April 4, 1872.

The Iron-clads of all Nations.

THE respective strength of the iron-clad fleets of various countries is now as follows; the figures, especially in the case of Germany, whence we receive the report, may surprise our readers:—England, 46 iron-clad vessels, 320 guns; France, 62 vessels, 400 guns; United States, 51 vessels; Russia, 25 vessels, 160 guns; Italy, 21 vessels, 208 guns; Turkey, 19 vessels; Holland, 17 vessels, 60 guns; Brazil, 15 vessels; Austria, 11 vessels, 182 guns; Spain, 17 vessels, 145 guns; Denmark, 6 vessels, 65 guns; Germany, 5 vessels, 59 guns. The number of iron-clads owned by the twelve nations mentioned is 285. Japan has one or two, we believe, and Peru bought two, such as they are, from our Government several years ago.

The weakness of Germany in this respect is remarkable, in view of the efforts recently made by the Admiralty to give the navy importance. Six new German iron-clads are building, but four of her five vessels of this kind now floating have plates only about five inches thick. She was hardly in a position to enter a contest with Brazil, especially as there are many German emigrants in Brazil, and no Brazilians in Germany. The advantage would, it seems to us, have been altogether with the South Americans. Of the fifty-one American vessels many are quite small, and nearly all of them unfit for service, and the three leading navies cannot be judged by mere numbers. Our vessels, however, carry very few guns, and for this reason even the small ones, provided their plates be heavy enough, are more formidable than much larger ships with lighter guns. While the iron-clads of France and England carry an average of six or seven guns each, our monitors carry never more than four guns, seldom more than two, and frequently only one gun.—*Evening Post.*

"WAXED WIRED THREAD."—This is the name given to a new article for sewing boots and shoes, lately produced by Messrs. C. Rowland and N. F. English, of Hartland, Vt. The new thread is spun with a wire cord, and is used either with or without waxing in the usual manner. It is claimed, by the Woodstock (Vt.) *Age*, to give a much stronger and permanent stitch than the thread commonly used for such purpose. The new thread is, of course, made by machinery, and is stated to cost but a trifle more than the ordinary kind.

NEW AMERICAN PATENTS.

WE give, as follows, notices of some of the most interesting inventions for which Letters-Patent of the United States have recently been issued :—

WROUGHT-IRON BRIDGE.—A. R. Boller, Orange, N. J.—*April* 2.—The particulars of this bridge are found in the use of channel bar-posts, swelling gradually from ends to center, and joined by means of lattice strips of iron, and uniting upon wrought-iron caps and basis. Also, in the connection of the top lateral bracing (sway brace and diagonals) by means of a bent plate having skew-backs for support of the diagonals.

COMPOSITION FOR THE MANUFACTURE OF DRAIN-PIPE, TILE, ETC.—C. J. Eames, New York City.—*April* 2.—In this resinous and carbonaceous substances are treated with an alkaline solution, and then combined with asphaltum and earth or silicious substances, with or without the addition of caoutchouc or gutta-percha, so as to form a composition suitable for molding drain-pipes, pottery, tiles, and the like.

CLOTHES-WRINGER.—A. H. Goss, Auburn, N. Y. —*April* 2.—This improvement comprises the combination, with a pair of squeezing or wringing rollers, one of which turns in movable and the other in immovable bearings, of certain suitably arranged driving gears, in such manner that one roll may move to and from the other as they adapt themselves to the varying thicknesses of cloth passing between them, without running out of gear with each other.

APPARATUS FOR FINISHING TUMBLERS.—D. C. Ripley, Pittsburg, Pa.—*April* 2.—In this apparatus is employed, for shaping tumblers or other similarly shaped articles of glass, a mandrel, either revolving while the tumbler is held stationary, or stationary while the tumbler is revolved upon it. There is also claimed a former or mandrel, in combination with a tool or follower, for forming tumblers and the like, either stationary while the tumbler revolves between them, or revolving while the tumbler is held stationary. Also, the combination of an arm appropriately provided with reference to the tool, and also in the combination of a spring with such tool.

FURNACE FOR MELTING IRON.—G. H. Sellers, Wilmington, Del.—*April* 2.—This inventor claims the combination in a furnace of two delivery flues, through which flames are introduced opposite each other, so that they will abut against each other in the furnace. Also, the combination with a suitable regenerative apparatus of a furnace into which gaseous fuel is introduced at opposite points. Also, the combination in a furnace of a circular or oval shell, an arched crown, and supporting bands. Also, the combination of an oval or circular casing and an arched crown which abuts against the roof of the furnace on a plane below the top of the casing. Also, in the combination of a charging door and the down-take or chimney of the furnace.

GLASS-BLOWER'S MOLD.—S. R. Bowie, New Bedford, Mass.—*April* 2.—The gist of this invention is found in a movable or rotary bed-plate or bottom former, in combination with a stationary mold or parts. The invention also includes a mold for forming the outer surface of a blown glass article, as made with an axially adjustable bed-plate or bottom former.

GAS-ENGINE.—G. B. Brayton, Boston, Mass.—*April* 2.—The essence of this improvement exists in the following apparatus or organisms in combination :—A pumping-engine for condensing air and gas; a reservoir for containing such agents, either separated or when mixed; and a cylinder and working piston provided with suitable automatic valve-gear operating eduction and induction valves, when such cylinder is furnished with a perforated partition, whose office is to maintain a torch to fire the successive charges of gaseous mixture as they are entering the cylinder, and prevent the back action of the ignited charge.

GRAIN SCOURER AND HULLER.—L. S. Chichester, Brooklyn, N. Y.—*April* 2.—In this machine is employed a revolving scourer formed with concentric cores and a roughed surface, in combination with stationary deflectors. There is also used a section made adjustable to regulate the discharge of the grain, in combination with the revolving scourer, constructed as specified, and the stationary deflectors arranged in suitable relation thereto.

PROPELLING STREET-CARS.—J. L. Simms and W. T. Duvall, Georgetown, D. C.—*April* 2.—This invention includes an endless-chain traction power, when divided up in sections of the route, and two or more of said sections geared together. Also, in combination with such traction power, a grappling apparatus so applied that the vehicle is made to automatically detach and attach itself in passing from one section to another of said traction chain. Also, the combination of carrying-wheels with the driving-wheels and chain. Also, the arrangement of an endless traction rope or chain, in connected sections, on a double track road, so that the descending load on a down grade is made available to aid the ascent of another load on the upgrade of the same or another section.

MANUFACTURE OF IRON.—J. Absterdam, New York City.—*April* 2.—This process relates to the production of bars with case-hardened surfaces, by first subjecting the iron bars in a rough state to the process of case-hardening, then heating and passing them through finishing rollers. The invention also includes a method of producing merchantable bars, plates, sheets, or slabs of wrought-iron or pneumatic metal, or both combined, by first subjecting the rough bars of iron to a process of case-hardening, then fagoting and re-rolling the same. Certain other features of somewhat similar tenor are also covered by the claim.

SHIPPING APPARATUS.—C. W. Baldwin, Boston, Mass.—*April* 2.—This improved means of moving a loose pulley or clutch upon its shaft, for the purpose of causing it to engage with that portion of the pulley or clutch which is made fast to the shaft, consists in a V-shaped truck arranged in a peculiar manner to secure the result desired. Certain other combinations of parts supplemental to that just specified are also included in the invention.

STEREOPTICON APPARATUS.—A. G. Buzby, Philadelphia, Pa.—*April* 2.—This invention embraces in a stereopticon apparatus the combination of two or more separate compartments, arranged one above the other, for the reception of lanterns or burners, and a side chimney, for carrying off the heat and products of combustion from the lowermost of said compartments. Also, a partition or screen consisting of a double casing of metal inclined upward toward the side chimney. Also, rods and certain mechanism whereby the lime pencils may be adjusted in the act of putting in or taking out the picture-slides or turning the dissolving-cock. Also, certain other novel combinations of parts adjunctive to those just above set forth.

TOBACCO-CURING APPARATUS.—C. W. Flippen, Laurel Grove, Va.—*April* 2.—This is a process of yellowing tobacco by applying heat and steam simultaneously and previous to the process of drying the leaves and stems. It also includes, in tobacco houses, the arrangement of furnaces on the outside and with shields on the inside, in order to distribute the heat more equably through the building. Also, vaporizers arranged on adjustable frames, which themselves rest on heating pipes when yellowing the tobacco, but are raised to receive thereunder charcoal boxes while moistening.

BRICK KILN.—B. R. Hawley, Normal, Ill.—*April* 2.—The most noticeable feature of this invention is a method of burning bricks, etc., by a descending stratum of intense heat retarded by and following a slower descending stratum of condensed or saturated steam, maintained conterminously throughout the burning process; also, by the continuation of these stratums below the lower courses of bricks; the steam necessary for the retention of the stratum of heat till the completion of the burning of the lower courses being retained in an ample chamber beneath the floor.

PROCESS AND APPARATUS FOR SEPARATING FATS AND OILS FROM SEEDS, GRAINS, ETC.—E. S. Hutchinson, Baltimore, Md.—*April* 2.—Among the more prominent points of this process is the employment of bisulphide of carbon, either by itself or in combination with other agents in the extraction of oily, resinous, or other matter soluble therein. Also, the employment of superheated vapor of or heated liquid bisulphide of carbon, either by itself or in combination with any other agent for the purpose specified. Aside from the mere extraction of the oil, this process has claimed for it the merits of drying the material from which the soluble matter may be extracted.

OVEN.—Alexander Crumbie, Jersey City, N. J.—*April* 9.—This invention relates to that class of bakers' ovens in which the loaves, crackers, or other material to be baked is caused to pass in a circuit through the oven in such manner as to be successively exposed to the heat in all parts thereof, from which it follows that all the loaves, or the equivalents thereof, are subjected to the same degrees of temperature, and a uniform quality, as far as the baking is concerned, is secured in the whole of the baked product. Its object is to provide an apparatus which shall be more compact in form and convenient in operation than those hitherto in use, as well as capable of affording a more economical and efficient application of the heat of the furnace during the operation of baking. To these ends the invention comprises a system of shelves suspended from travelling axles, held at suitable distances apart by connecting bars, in combination with travelling rollers and guides for determining the course of the shelves when made to travel through the oven. Also, a novel arrangement of parts for giving the requisite intermittent movement to the system of shelves when in active use. Also, in a novel arrangement of the heating flues with reference to certain other parts of the apparatus, whereby an efficient and economical diffusion of heat within the oven is secured. Also, in a novel means of cooling the oven when required, whereby is effectually avoided the temporary rise in temperature incident to the increased inflow of air to the furnace when the doors are opened to cool the oven in the ordinary way. This invention was illustrated on page 129 of our current volume.

LIQUID METER.—Isaac P. Tice, New York City. —*April* 9.—This invention relates to that description of liquid meters in which cylinders, with pistons working therein, are employed as the measures of capacity. The invention consists in a novel construction and arrangement of the cylinders, their passages and parts, whereby increased simplicity is attained in the production of the same as a whole, together with greater economy and less liability of making waste or imperfect castings. The invention also includes a continuous construction of the valve chambers with the cylinders of the meter, and of like diameter therewith, in combination with partitions dividing them from the cylinders, whereby the valve chambers may be bored out at one and the same time, and in a continuous manner with the cylinders, and whereby the construction of the meter as a whole is further simplified and cheapened.

SUGAR-MELTER.—William Hocking, New York City.—*April* 9.—In order the better to explain the nature of this invention, we will briefly refer to the melter commonly used for dissolving raw sugar. This consists of a pan which is furnished with a rotary stirrer driven by gearing, and with pipes for the introduction of steam. This invention consists in an upright pipe or hollow shaft arranged centrally in the melting-pan, and having near its lower end hollow arms or branches, that are perforated along the opposite sides, and constitute with the said shaft what is commonly known as a "Barker's mill," which is operated by the passage through it of the steam that is introduced into the contents of the pan, thus obviating the necessity of gearing or other mechanism for driving the stirrer.

SODA WATER WAGON.—Jonh Matthews, New York City.—*April* 9.—This invention relates to wagons, and other vehicles, for the transportation of fountains charged with soda-water and other aerated or gaseous liquids under pressure, for supplying venders or dispensers of said liquids. The invention consists in a wagon or vehicle for said purpose, divided into compartments, which are constructed to admit of the fountains, or certain of them, being introduced and withdrawn from either side of the vehicle, and to separately hold the same from rolling about. It likewise consists in a novel arrangement of the compartments in tiers, a portion of which extend across the vehicle to facilitate the entry and withdrawal of certain of the fountains from either side of the vehicle, and a portion of which compartments are longitudinally disposed in rear of the vehicle, to provide for the introduction and removal of the remaining fountains composing the load through the back of the vehicle, so as to be free from interference by

[...] rear wheels of the vehicle. The invention [...] consists in a combination with the compart[...]nts, or certain of them, of shuttles operating to [...]mit of the insertion at the fountains, but pre[...]ting their accidental escape or working out, [...]stantially as described.

[F]IRE-ARM HAMMER.—Franklin Wesson, Wor[ces]ter, Mass.—*April* 9.—The object of this in[ven]tion is to enable both central and rim fire [am]munition to be used in the same fire-arm and exploded by the same hammer. To this end it [con]sists in the novel construction of a movable [ba]se-piece and novel arrangement of the frame [wi]thin the head of the hammer, whereby it may [be] adjusted so that its upper portion will effect the [di]scharge of rim fire ammunition, or so that its [lo]wer portion will effect the discharge of center-[fir]e ammunition.

EMBOSSING PRESS.—Leverett H. Olmsted, New [Yo]rk City.—*April* 9.—This invention relates to [th]at class of embossing presses which operate by [di]rect pressure, and are designed as substitutes [fo]r the more expensive rotary embossing machines [in] common use, whose cost precludes their general [a]doption by families and others having but little [w]ork for them. It consists in a novel construc[ti]on of the press itself, and a novel construction [o]f the embossing dies with sheet-metal faces, [w]hereby a cheap and very effective press is ob[t]ained.

ELECTRO-MAGNET.—Isaac P. Tice, New York [C]ity.—*April* 9.—This invention consists in a com[p]ound electro-magnet, having its limbs surrounded [b]y helices of unequal size or length wound in op[p]osite directions upon each of its limbs, so that [a]ccordingly as the current of electricity with [w]hich the magnet is charged is changed from one [p]air of helices to another, the magnetic polarity of the limbs is reversed, and the whole mass of the limbs virtually demagnetized.

BEVERAGE DISPENSING AND RECORDING AP[PA]RATUS.—John Matthews, New York City.—*April* 9.—This invention is more particularly designed for dispensing soda-water on draught, with sirups to sweeten and flavor it, and, as applied to such purpose, it consists in an apparatus in which a charge of any required sirup suitable for a single glass or draught is injected into the soda-water cooler or reservoir at or near its base, and, on opening the tap to furnish a glass or draught, is washed out by the soda-water drawn from the reservoir to form said draught, thus dispensing the soda-water sweetened or flavored as required. The invention furthermore includes, in connection with the devices by which the sirup or sirups is or are injected into the soda-water cooler or reservoir, a counter or counters for registering the number of draughts made upon the apparatus, and draughts of the sirups used either separately or collectively, the whole constituting a dispensing and recording apparatus which, while affording every facility as regards varying the flavor of the compound, acts as a check against fraud, and forms a ready reckoner to the vender of the business doing or done.

COMMISSIONERS' DECISIONS.

W. B. AND W. O. BARTON—*Ex parte.*

[*Appeal from the Board of Examiners-in-Chief in the matter of the application of W. B. and W. O. Barton for Letters Patent for an* IMPROVEMENT IN WOOD PAVEMENTS.—*Decided March 28, 1872.*]

CHANGES OF FORM: WHEN PATENTABLE.

A change of form may in certain cases confer structural advantages, and so bring the invention within the requirements of the law and the official practice.

LEGGETT, *Commissioner :*

The alleged invention in this case is fully and definitely set forth in the claims, which are as follows:

1. A wooden pavement composed of blocks, each block being two geometrical figures in vertical cross-section, the lower portion an oblique-angled parallelogram, and the upper part or portion of trapezoidal shape, substantially as shown and described.

2. The combination, in paving-blocks, of the side shoulders D and E, and the bevels, *e e'*, of their lower ends, so that each block will have a bearing upon shoulders, D, of the adjacent blocks on the one side, and upon the bevels, *e*, of the adjacent blocks on the opposite side, substantially as shown and described.

3. In combination with the side shoulders and bevels mentioned in the foregoing claim, we also claim the end bevels of the blocks, so constructed as to form an arch across the street, substantially as described.

This case has been held under consideration for a long time, not because of any doubt of there being as much difference between it and any of the references cited to defeat it as between other similar devices which have been patented, but because of the doubtful policy of granting patents upon such slight differences as have been regarded as patentable in this class. Wood pavements have received much attention for several years past, and, as they are now beginning to be regarded with favor in many sections of the country, there is among inventors a diligent effort being made to devise the very best form of block, having in view stability and durability. The result has been the patenting of many different forms, and the rejection by the Office and by the country of many more. Some would-be inventors seem to think that a mere change of form should be enough to secure a patent, whether such change in form secures any new or improved result or not. The case in hand, however, seems to present some radical differences from the devices cited as references. There is a combination of square shoulder and sloping locks not elsewhere found, also of side and end locks. The square shoulder gives a positiveness of lock not secured by the sloping lock; yet applicant's device has the advantage of the square shoulder on one side, and the sloping lock on the other. Applicant's block, also, has the end so beveled as, when put in position, to secure the proper arch from curb to curb.

Upon a careful examination of this case and of the references, and upon a review of previous actions of the Office in pavement cases—especially my predecessor's decisions in the cases of *Samuel Toomey*, C.D., 1869, p. 109, and of *L. I. Follansbee*, C.D., 1870, p. 127—I must decide the applicants entitled to a patent.

The decision of the board of appeals is reversed.

SAMUEL VAN SYCKEL—*Ex parte.*

[*Appeal from the Examiners-in-Chief on an application for Letters Patent for an* OIL-STILL.—*Decided April 2, 1872.*]

INVENTION.

An oil-still in which the uncondensed explosive gases, instead of being discharged into the open air, are drawn by a current of steam into the furnace, and there consumed, is not met by an apparatus in which steam is used for carrying vaporized petroleum into the combustion chamber of a furnace, when the sole object is to utilize petroleum for a fuel; nor by an oil-still in which the uncondensed gases pass into a hydraulic main, and thence, by the force of their own pressure, or by the added weight of the gasometer, into the furnace.

DUNCAN, *Acting Commissioner :*

If this invention were for a method of vaporizing petroleum and other hydrocarbon oils or substances, and using the same when mixed in this condition with air or with steam for supporting combustion in a furnace, the references would be conclusive against the application.

In fact, however, this use of the vaporized hydrocarbon in the present instance is a mere incident of the invention. The main object aimed at by the inventor was, not to produce a superior combustion in the furnace of his oil-refinery, but to relieve the process of refining petroleum from one of the chief elements of danger which had generally attended it. This danger arose from the inflammable character of the volatile hydrocarbons evolved in the process of distillation, which had usually been carried off into the air, and formed with the same a highly-explosive mixture. The liability of serious accidents from the ignition of these gases by contact with sparks and flame seems to have been a source of great and constant danger, and must have contributed largely to increase the expense of carrying on a refinery.

To eliminate this element of danger in the process of refining petroleum, applicant proposes to connect the escape-pipe through which the gases are carried off from the oil reservoir with a steam-pipe leading directly into the furnace, and by this means the flow of steam from the steam-generator into the furnace will draw with it the gases that are generated in the still. Thus, not only will the combustion of the furnace be improved by the burning of the inflammable gases discharged into it, but, which is of more importance, the still will be relieved of the accumulation of these gases without at the same time charging the atmosphere with a dangerous explosive.

The invention of Tweddle is the only one among the references that requires special mention. In Tweddle's still the uncondensed gases are conducted from the oil-reservoir through a suitable pipe to a hydraulic main, or through such main to a gas-holder of ordinary construction, and from this main or reservoir they are led to the furnace and consumed.

In this apparatus the pressure of the gas and the weight of the gasometer are relied upon for passing the gas into the furnace. In applicant's apparatus the same work is performed by means of the current of steam flowing from the boiler. It is a simpler and apparently surer method of accomplishing the desired result; at any rate, it seems to be essentially different from the other; and the fact that steam has previously been used for carrying vaporized petroleum into the combustion-chamber of a furnace, where the sole object was to utilize petroleum as a fuel, does not seem to militate against the patentability of the proposed method of protecting oil-refineries against the danger arising from the accumulation in its vicinity of the explosive gases evolved in the process of distillation.

The decision of the examiners-in-chief is overruled, and applicant adjudged entitled to a patent.

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[*This list is condensed weekly from the "Journal of the British Commissioners of Patents," expressly for the* "AMERICAN ARTISAN."]

685.—IRON AND STEEL.—Z. S. Durfee, New York City.—March 6, 1872.

698.—MAGNETIC INDICATOR.—H. Glover, Brooklyn, N. Y.—March 7, 1872.

701.—HORSESHOE.—A. Quinn, Brooklyn, N. Y.—March 7, 1872.

702.—CARDING MACHINE.—I. Lindsley, Pawtucket, and W. L. Bartlett, Valley Falls, R. I.—March 7, 1872.

705.—MALLEABLE CAST-IRON.—A. F. Andrews, New Haven, Conn.—March 7, 1872.

706—TYPE-SETTING MACHINE.—J. W. Paige, Rochester, and D. Reynolds, Albany, N. Y.—March 7, 1872.

714.—ROTARY ENGINE, ETC.—C. Avery, Tunkhannock, Pa.—March 8, 1872.

734.—PROPELLING VESSELS, ETC.—Mot & Weaver, Providence, R. I.—March 9, 1872.

745.—BILGE-WATER INDICATOR.—A. Harris, New York City.—March 11, 1872.

762.—BATTERY GUN.—W. A. Miles, Salisbury, Conn.—March 13 1872.

770.—APPARATUS FOR PREVENTING INJURY TO RAILWAY CARRIAGES.—Emery, Doyen & Sparrow, Portland, Maine.—March 14, 1872.

777.—DIAL-PLATE.—Dunn, Lewis & others, Rutland, Vt.—March 14, 1872.

783.—ELECTRIC TORCH.—W. W. Batchelder, New York City.—March 14, 1872.

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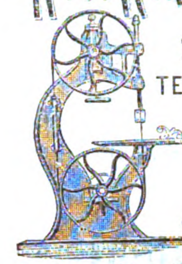

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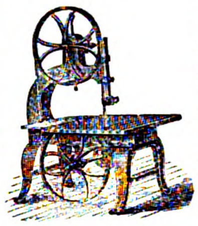

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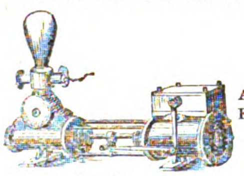

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WE would call the *special attention* of INVENTORS and PATENTEES to the advantages which must result from having engravings of new machines, tools, etc., published in the AMERICAN ARTISAN. The illustrations shown in the present number are fair specimens of the skill and taste of our artists. We are prepared to execute such engravings *at short notice* and *very moderate prices*—in fact, we require only the mere cost of the engraver's labor, charging nothing for a large amount of space devoted to descriptive details, and (whenever requested we shall subsequently send the engraved blocks to the inventor by express, for use in circulars, handbills, or other purposes.

None but ORIGINAL illustrations—preferably executed by *our own engravers*—will be published in the AMERICAN ARTISAN. Distant patentees desiring to have their inventions illustrated and described in our columns, should at once send us a small model of their machine, by express (prepaid); or mail a good photograph, together with their LETTERS-PATENT, to our address. We will then promptly examine the same, and return a reply, stating the precise expense of the engraving, the payment of which will be always required in *advance*. Address models, documents, etc., for the above object, as follows:—

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AMERICAN ARTISAN.

A WEEKLY JOURNAL OF ARTS, MECHANICS, MANUFACTURES, ENGINEERING, CHEMISTRY, INVENTIONS, AND PATENTS.

VOLUME XIV. New Series. | NUMBER 17. | NEW YORK, APRIL 24, 1872. | $2 00 PER ANNUM IN ADVANCE. SINGLE COPIES, FIVE CENTS.

CONTENTS OF THIS NUMBER

[Illustrations are indicated by an asterisk.]

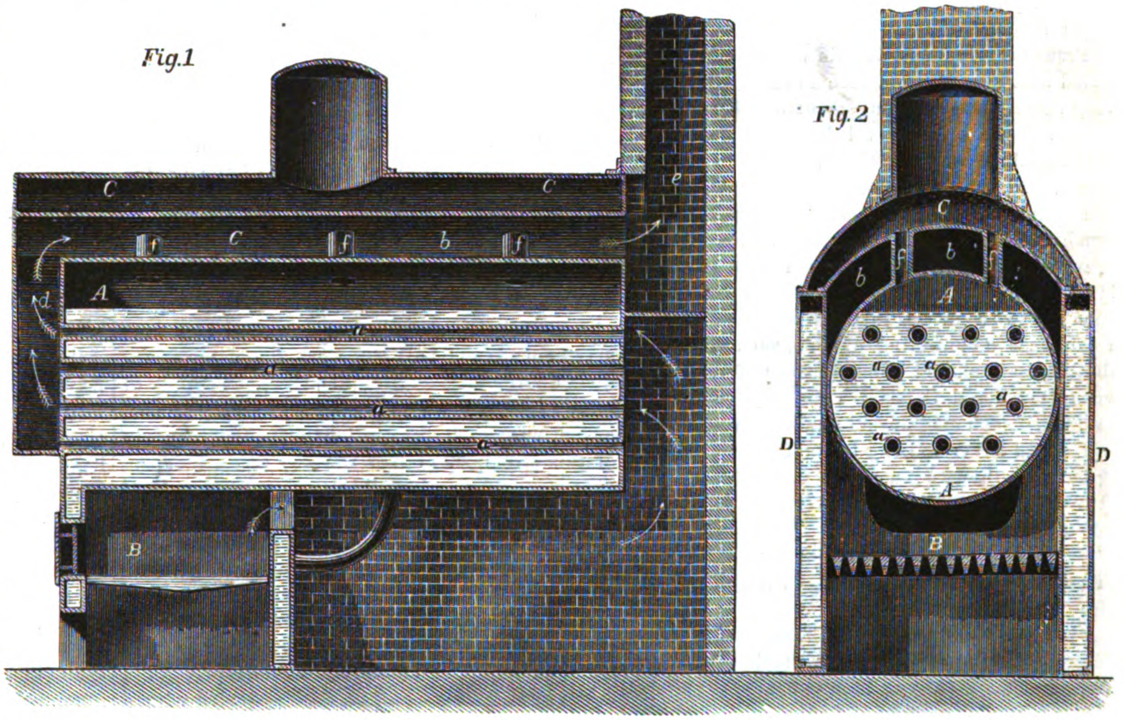
Smart's Patent Steam-boiler.

OUR engravings, Fig. 1, a vertical longitudinal, and Fig. 2, a vertical transverse, section, represent an improved construction of steam-generators designed to insure the quick separation of the steam from the water, thereby diminishing the danger of explosion, while, at the same time, the heat evolved from the fuel in the furnace is, it is claimed, more fully utilized than in boilers of the ordinary kind. As will be seen from the subjoined description, the essential feature of the invention is found in the use of a steam-arch or vessel above the cylindrical body of the boiler, and its connection with the latter in such manner that a smoke passage is formed between the two.

A is a cylindrical steam-boiler of the requisite size and proportions, and provided with the longitudinal flues, *a*, and supported in suitable relation with the furnace or fire-box, B. C is a hollow arch of concavo-convex cross-section, as shown in Fig. 2, placed above the boiler and connected with it by means of pipes in such manner that a thorough circulation may be had of the liquids contained in both. A horizontal smoke-passage, *b*, is formed between the boiler, A, and arch, C, communicating with a smoke-chamber, *d*, formed in front of *a*, and with the chimney, *e*, in rear. The arch, C, is supported by and connected with the hollow sides, D, that inclose the fire-place and communicate with the feed-water supply. The products of combustion pass from the fire-place backward under the boiler, A, then forward through the flues into the chamber, *d*, and back again through the passage, *f*, into the chimney, *e*. The arch, C, being above the boiler, receives steam from the same as fast as formed, and, it is stated, relieves the boiler, A, of considerable pressure. The final passage of the gaseous products of combustion under the arch renders the latter a kind of superheater in case the heat is brought to a sufficiently high degree.

The same essential principle of construction may be applied in steamboat and locomotive boilers, in such cases the gaseous products of combustion being passed back through the usual tubes into a smoke-chamber at the rear, and thence through a return-flue between the boiler and the arch to the uptake or chimney.

This invention was patented Feb. 20, 1872, by Michael Smart, 546 West Twenty-eighth Street, New York City, who has made arrangements for the manufacture of the improved boilers with Smith Brothers, corner of Jay and Plymouth Streets, Brooklyn, N. Y.



SMART'S PATENT STEAM-BOILER.

Around the World.

SOME years ago, a Boston capitalist was visited by a Yankee schoolmaster whose head was bursting with a great idea. It was this:—He proposed to build, somewhere near Boston, two immense hemispheres, each about an acre in extent, upon whose convex surface should be represented, in relief or depression, the seas, islands, continents, rivers, mountains, valleys, kingdoms, empires, republics, cities, towns, and villages of the world, each in accurate proportion to the size of the hemispheres. It was to be the world in miniature. The material was to correspond with the geologic formation of each country—granite to be represented by granite, chalk by chalk, sandstone by sandstone. The ocean and rivers were to be real water; chemical appliances were to be called into requisition to supply volcanic eruptions, and whitewash was to be used as a substitute for snow at the poles and above the snow-line on mountain ranges. This was not intended, as one might suppose, for educational purposes, but to enable persons desirous of seeing foreign countries to do so without the trouble and expense of the journey.—*Exchange.*

Bad for the Cats.

THE ingenious boys of Alleghany City, Pa., have hit upon a new invention quite worthy of the rising generation. They catch all the stray cats that do not succeed in escaping their clutches, dip their backs in tar, and then roll them in gravel. This gives them an invulnerable suit of armor, the advantages of which must be appreciated as soon as they engage in one of those free fights for which cats are somewhat noted.

But this is excelled by the masterpiece of a genius hailing from Toledo, Ohio, who has devised a patent cat exterminator. This is described as a large sheet-iron cat with cylindrical attachment and steel claws and teeth. The motive power is like that of a clock; the tail is swelled by a bellows in the interior, which also, by a tremolo attachment, causes the patent cat to utter wild cries of defiance. The machine, being duly wound up, is placed upon the roof of the house. Roused by its diabolical yells, every cat within half a mile rushes to action, sometimes from 50 to 100 attacking at once. Then the iron teeth and claws begin to work with lightning rapidity, and all the adversaries within six feet of the machine are torn to shreds.

Electro-motors for Sewing-machines.

A RECENT English invention consists in arranging in a frame, on the rear section of the stationary arm of a sewing-machine, two sets of electro-magnets, between which oscillates a motor-lever (connected with the sewing needles), and provided with armatures, acted on by the magnets connected with the battery by the wires and connecting screws. These electro-magnets, being arranged in two sets, are so connected that the magnets of each set are simultaneously excited, and further connected by a cross-current wire, so that, when the current-breaker interrupts the circuit with one set, it shall instantly be completed with the other set, and thus impart to the lever a continuous oscillating movement. The sliding current-breaker travels over a bar to and fro, and is retained in position by stationary guide and bearing-pins. The inventor also claims providing the motor-lever with armatures with a receding or recessed face, having perforations for the escape of compressed air.

The British Channel Tunnel.

THE plan of cutting a submarine tunnel between France and England is assuming a practical form. About one hundred and fifty thousand dollars are to be first expended in an experimental drift-way; one-third of this amount has been subscribed, several leading noblemen in England taking a special interest in the enterprise and leading the subscriptions. An English deputation recently waited upon M. Thiers to obtain the support of the French Government in this undertaking. He replied that France could vote no capital, but that every facility and encouragement which the government could offer would be freely extended. No material aid was looked for, under the circumstances, and the Englishmen interested seem to have been satisfied by the position assumed by the French President. The work, when once actually begun, will probably be continued with great rapidity. It is curious that, while the traffic between the two countries justifies capitalists in such an immense undertaking as this, such miserable tub-like boats should monopolize the ferriage between Dover and Calais. This may be for the best; for, if such magnificent steamers as float upon the Hudson River or Long Island Sound were plying between the two points, the demand for a tunnel would be much less emphatic than it now is. —*N. Y. Evening Post.*

TEMPERING SPIRAL SPRINGS.—Take oil and put it into anything you have of the size for dipping your job in, two inches deep, add water with about one ounce of common washing-soda to the pint, about two inches deep. Have a tube to heat your springs in, or, a better way, make the tube red-hot and insert the springs, and when hot toss them into the prepared bath. Take carefully out and put into a tin. Cover with oil, and put over the fire until it boils and catches fire. It will first burn blue. Keep it there a few moments until it boils clear and bright; then slack down by plunging it into oil altogether. You will find them the right temper for springs for any purpose.—*Cabinet Maker.*

THE cultivation of the poppy in France is steadily increasing, and it now occupies about 50,000 acres, of the value of 4,500,000 francs, yielding opium to the value of 2,000,000 francs per year. Different samples of opium raised in various parts of Europe yielded from 8 to 13 per cent. of morphine.

COMMISSIONER'S DECISION.

MURDICK LYTLE—*Ex parte.*

[*Appeal from the Examiners-in-Chief.*—IMPROVEMENT IN OIL-WELLS.—*Decided April* 10, 1872.]

NEW APPLICATION OF IDEAS: WHEN PATENTABLE.

The use of a given material or of a mechanical device for one purpose does not necessarily prohibit the patenting of it for another different and not analogous purpose.

The novelty of an improvement in operating oil-wells, which consists in so connecting a number of wells with a single engine that any one of the series may be worked at pleasure, is not disproved by reference to the mechanical expedient of operating the various machines of a workshop from a single line of shafting, nor by the use of one primary engine to supply condensed air as a motive power to several secondary stationary engines.

The proposed new application of the general idea of distributing power from one prime source to several different points is so lacking in analogy to the applications above cited that it must have involved the exercise of invention, and, being meritorious in an economic view, it is patentable.

DUNCAN, *Acting Commissioner:*

Applicant, in making the invention on which he asks a patent, has sought to devise an economical mode of working the abandoned oil-wells of the petroleum regions, which, because of the comparatively small amount of oil which they now yield, cannot longer, it is alleged, be profitably worked by any of the methods heretofore applied. In the pump which he employs in any particular well there is no element of novelty. He makes use of the well-known condensed-air pump or ejector, in which the condensed air which is forced down one tube carries the oil with it in its discharge through a second tube. The peculiarity of applicant's process consists in connecting a large number of such pumps with a common source of supply of the condensed air, and providing each pump with a stop-cock, whereby communication between it and the engine may be shut off at pleasure. Under such an arrangement, all the stop-cocks but one being closed, the whole power of the engine may be put upon that one well; which may be worked until its supply of oil is exhausted; and then by similar means the engine may be made to work any other well in the series.

The advantage of this system is that one engine of a capacity to operate but one well at a time may be made to do all the work found necessary upon a large number of wells, since the supply of oil in each is so small that the engine may be connected successively with them all. The economy of this arrangement over the use of an independent engine for each well is too apparent to call for comment. Without this or some tantamount mode of economizing power, it is claimed—and not unlikely with reason—that the larger number of wells in the oil-producing regions must remain valueless and unproductive; with it, it is claimed, they may be made to yield an annual product of great value. The claim is, in substance, for a series of ejectors or pumps, each provided with a branch-pipe and cut-off, in combination with a common main supplied with condensed air.

The interpretation put upon this claim by the examiner is, that it is for "tapping a main along its course for the use of its supply of fluid, at discretion"; and accordingly he rejects it upon reference to the water-mains of cities, which are supplied with branch-pipes for the accommodation of the inhabitants, and to such arrangements as that shown in Gatling's withdrawn application of 1855, in which an indefinite number of secondary stationary engines are supplied from a common reservoir of condensed air, which is kept filled by the action of the primary engine.

If the interpretation of the claim adopted by the examiner were the correct one, the references would be a complete answer to it. I can but think, however, that this interpretation is too broad. Applicant's invention is, in reality, an improvement in the mode of operating oil-wells; and while, in carrying out this improvement, he does not profess to be the first to avail himself of the broad idea of distributing power from one prime source to various points of application—a thing which is common in all machine-shops where a number of machines are operated from a single line of shafting—yet the use here made of this common expedient in the industries is so remote from all analogy with any of the uses named, or any that now occur to my own mind, that I can but conclude that the inventive faculty was necessarily laid under contribution in originating and perfecting the suggestions that have found embodiment in the application now presented for a patent. The use of a given material, or of a mechanical device for one purpose, does not necessarily invalidate patenting it for another different and not analogous purpose.—*Jenkins* vs. *Walker, P. O. Gazette*, 1872.

If the inventor's expectations as to the economic results of his work should be realized—and it is but reasonable to suppose that they may be to a considerable extent—then he will have enlarged notably the range of one of the great productive industries of the country; and this result, too, will have been produced, not as a mere corollary from existing inventions in other departments of the arts, but from a careful study of all the conditions of the somewhat perplexing problem to which the applicant's attention has been directed.

I think there is novelty in the invention, and that a patent should be granted.

The decision of the examiners-in-chief is accordingly reversed as to the first claim. This claim fully covers this invention.

The second claim is general in its terms, and is fully answered by the mode of controlling power shown in the application of Gatling, above referred to, and it is rejected.

Rolled vs. Hammered Ingots for Rail-making.

ON page 170, current volume of the AMERICAN ARTISAN, we presented a paper read by Mr. J. B. Pearse before the American Institute of Mining Engineers, in which strong preference is given to hammering ingots for steel rails as against rolling. We give below a paper read on the same occasion by Mr. A. L. Holley, in which a conclusion directly the reverse of this is advocated:

"In order to put sufficient *work* on steel ingots for rails, they must be reduced from about 12 inches square. As this cannot be done at one heat, they are first drawn down to about 7 inches square, and then reheated and rolled into rails. This first reduction or "blooming" is usually done in this country in a 30-inch 3-high rolling mill, with movable rolls, so as to get several reductions in each set of grooves. The first of these mills has been running at the Troy Steel-works above a year, with great success. Another at the Cambria Iron-works has been running about six months, and has produced 140 tuns of rail-blooms from 12-inch ingots in 24 hours. The mill was not then fully employed, the limit of capacity being a single Siemens heating furnace.

"The practice is now being introduced of rolling long 12x14-inch ingots, instead of short 12x12-inch ingots, thus producing three rail-blooms at one rolling, instead of two, and saving largely in labor and fag-ends. As the handling of the piece at the rolls, and, indeed, its charging and discharging at the furnaces, are performed by steam

power, the large ingot requires no more men than the small one. The capacity of a blooming mill, rolling 3-rail ingots, may be safely put at 200 tuns per day.

"In England, and also at the Pennsylvania Steel-works at Harrisburg, the rail-ingots are reduced to blooms by hammering, usually under 10 to 15-tun hammers. The 13-tun hammer at Harrisburg is a first-class tool, and the practice with it is unusually good. Its maximum production is about 75 tuns of blooms per day, or much less than half that of the rolling mill, which costs, with its engine, about the same money. A smaller number of men, and less skilled and high-priced men, are employed at the rolling mill. By the use of Mr. Fritz's feeding-tables, the labor at the rolls is reduced to little more than directing the operations of the machinery.

"Three-rail ingots cannot be advantageously handled under a hammer.

"The impression has heretofore existed among railway men that the quality of what they call hammered rails is superior to that of rolled rails. The use of the *rails* has not developed this impression, so far as can be ascertained. The impression is founded on the fact that *iron* is improved by hammering, and that the highest-priced steel—such as tool-steel—is hammered rather than rolled.

"It is true that the pressure of the hammer is greater and more concentrated than that of the *light rolls usually employed*, and that the hammer may expel more cinder, in the early stages of the *iron* manufacture. The reason why the hammer is used in iron mills, however, is because it will work large and hard puddle-balls and piles for which there is no adequate rolling machinery at hand. That rolls are preferred to hammers, even for iron, in the most improved practice, is shown by the introduction of very heavy squeezers instead of hammers for reducing the large puddle-balls of the Danks furnace.

"The hammer certainly increases the density of an iron or a steel bar, as compared with rolling. The rolls crowd the fibers back, as well as towards the center; the action of the hammer is exclusively towards the center. This is conspicuously shown in treating large ingots. The velocity of the hammer is greater than that of the periphery of the roll, hence the effect of its impact is greater on the *surface* of the ingot, while that of the rolls is more distributed throughout the thickness of the ingot. It would therefore be supposed that the hammer would *draw* the surface of the ingot so much as to leave concavities in its ends. The rolled bloom is cup-ended, *although* it is more uniformly condensed than the hammered bloom. The result of this must be, and the fact is, that the rolled ingot is less dense; it weighs less per cubic inch, but, at the same time, it is more uniform in structure. Now, this density does not promote toughness in *steel*, whatever it may do in iron, while uniformity *does* promote toughness, and this is the quality to be most carefully looked after in the steel rail manufacture. Nearly all steel rails are hard enough for wearing purposes, and their hardness can be increased by chemical means, with the greatest uniformity and convenience—indeed, the trouble is to sufficiently keep down phosphorus, silicon, and other hardening agents.

"It is stated that the carbon in hammered steel is chemically combined, while that in rolled steel is graphitic. If this is the fact in regard to rails, it is a strong argument in favor of rolling. As we have just observed, steel-makers, with the irons they have, find difficulty enough in making their rails mild and tough without being subjected to the additional embarrassment of chemically combined carbon. It is well known that the tool-makers' process of hardening is simply combining the carbon while *annealing*—that safety process to which boiler-plates and forgings are subjected to give them toughness, consists in simply rendering this carbon graphitic—the same thing that rolling is said to do.

"But, in fact, rail-makers are not embarrassed by the hardening process imputed to hammering, because there is no such thing as a hammered rail, or as a structural condition of rail due to hammering. Whatever the condition of carbon in a hammered *bloom*, it is graphitic in the rolled *rail*. The reheating of the bloom, and its subsequent treatment by rolling alone, probably leave the physical condition of the steel substantially the same as if it had been rolled rather than hammered *before* reheating—excepting only the condition before mentioned, due to the character of the pressure—the rolled steel is less dense, and is more uniform. This uniformity is further increased by the fact that the temperature of a rolled ingot is practically the same at each pass, while the hammered ingot is reduced at varying temperatures.

"A very large number of experiments have been made, at Troy and Johnstown, on rolled and hammered ingots from the same steel, and although the results confirm the above reasoning, rather than contradict it, the difference in the quality of the rails is not very marked. In fact, a large number of rails rolled direct from 9-inch ingots are wearing as well so far (three years) as rails made from either hammered or rolled 12-inch ingots. In making *complete* tests—tests to destruction—it is unnecessary to say that the size of the ingots experimented on by the hammer and the rolls should be the same. A test in which rolled 9-inch ingots are compared with hammered 12-inch ingots has no value.

"The use of hammers or rolls for blooming seems to resolve itself, then, into a question of cost of product, as it has been impossible to establish, so far, any marked difference in quality—certainly none in favor of hammering.

"We have shown that the rolling mill has over twice the capacity for a given cost, and that it employs less labor. Another advantage of the rolls is that their collars hold up the corners of the bloom, thus reducing its cracking, and making sounder rails, as well as a larger number of first-quality rails from a given number of ingots. Rolled blooms are of exactly uniform cross-section, while hammered blooms must vary considerably. Hence the crop ends of the former may be reduced to a uniform minimum, while a large allowance must always be made in hammering."

Annual Report of the Board of Regents of the Smithsonian Institution: Showing the operations, expenditures, and condition of the institution for the year 1870. Washington: Government Printing Office. 1871.—This volume contains, among much other interesting matter, a eulogy, by Prof. Joseph Henry, on "Alexander Dallas Bache," late Superintendent of the United States Coast Survey; "A Lecture on Switzerland"; an article on the "Life and Labors of Henry Gustavus Magnus"; another of much scientific interest on "The Relation of Food to Work"; another on "Antiquities in Tennessee"; and several—somewhat dry reading, but well worthy of study—on subjects relating to meteorology.

The Great Eastern and the New Cable.

Since 1865, the *Great Eastern* has been exclusively devoted to submarine telegraphic purposes, and during that time has laid in various parts of the world no less than 20,000 miles of deep-sea electric cable, all of which is now in good working order. The capital invested in those various cables is estimated at $35,000,000. But the services rendered to commerce and humanity are incalculable. Time has been annihilated, and all the nations and families of men have been brought within speaking distance of each other. But for the *Great Eastern* it is almost certain that the Atlantic cables would not have been laid. The huge vessel was alone capable of affording the accommodations required for stowing away the thousands of miles of heavy cable necessary, and, above all, she alone was found to possess the evenness or steadiness requisite for paying it out without difficulty or disaster.

But the laying down of the Atlantic cables constituted only a portion of the services of the *Great Eastern* to humanity during the last seven or eight years. She has laid down submarine cables in all parts of the world. The British, Australian, China, Submarine, British Indian, and British Indian Extension, are only a few of the enterprises in which she has been engaged. She has traversed the Pacific, the Southern, and Indian Oceans, as well as the Atlantic, in her errand of civilization.

The *Great Eastern* has been once more chartered to lay a fourth transatlantic cable, and is now lying at Sheerness awaiting its completion. The contract for the new cable has been completed and duly signed. The cable is to be manufactured by and laid down under the auspices of the Telegraph Construction Company of England.

Concerning Bricks.

Whether for light floor vaulting and partitions, for ventilation and chimney flues, or to exclude cold by the layers of air they contain, the property of saving some 33 per cent. in raw material, in coal, in time of drying, and in weight, makes these bricks invaluable.

They are stronger than solid brick for the same section. Numerous small holes, say 24 to 48, are better for strength than a few large ones.

To diminish the consumption of mortar, and present a smooth face, the holes are sometimes closed up on five faces and left open only on the sixth. Expressing brick machines are used. The clay requires more preparation than for solid brick. Hexagonal hollow tubes are a variety of this ware. Light porous bricks, being light and poor conductors of heat, serve for vaulting, flooring, and chimney-stacks. They hold mortar, and stand fire well, but weather ill, unless made of infusorial silex. Infusorial silex (80 silica and 20 water, besides a few impurities) mixed with four per cent. of fat clay makes a good brick. This infusorial silex, when raw, is a trifle lighter than water, but washed and dried it weighs less than half; the bricks weigh one-fourth of ordinary brick, shrink one-twentieth, and are much used for arching in Berlin (Kerl).

By mixing organic substances, such as peat, coal, sawdust, straw, flax, and sometimes lignite ashes, etc., with clay, the firing consumes these, leaving numerous pores in the brick. According to the desired lightness and strength, one volume of fat or plastic clay is mixed with one-half to three volumes of coal-dust, etc. Sandy clay will not answer. A high porcelain heat is required, and the substances added to the clay assist greatly in producing this heat.—*Beckwith's Report on Pottery at the London* (1871) *Exhibition.*

International Exposition.

THE "National Society for the Encouragement of Industrial Operatives" will hold a "Universal and International Exposition" at the "Palace of Industry," Paris, from July 15 to Oct. 15, 1872. Premiums of gold, silver gilt, silver, and bronze, and certificates of honorable mention, will be awarded. The articles on exhibition will be divided into forty-six classes, and arranged in ten groups, as follows:—Food, clothing, dwellings, household furniture, tools, and industrial processes, moral and physical development, institutions and laws in reference to workingmen, medicine and popular hygiene, the history of labor and of workingmen, and miscellaneous. Exhibitors must bear the expense of packing, transportation, and fitting up show-cases, and must suffer the risk of damage to their goods. Particulars of this exposition can be obtained of A. L. de La Forest, French Consul-General, New York.

New Lamps for New York.

THE old, dingy street lamps in New York City are being taken down from the main streets, and sent to the repair shop to be renovated and remounted in other places. Convinced that the globe lamp is superior to the older pattern, the city government has just purchased one hundred of them, to be put up on Broadway from Union Square down to Broome Street. It is believed that these lamps utilize more of the gas, as they tend to reflect the rays around instead of allowing them to shoot upwards. These lamps have already been introduced in the public parks, much to the improvement of the scenery, and the appearance of Broadway will be enhanced in a like proportion. Although the cost of these lamps is $6 25 apiece against $3 25 for the old ones, the Commissioner of Public Works is satisfied that they are cheaper in the long run.

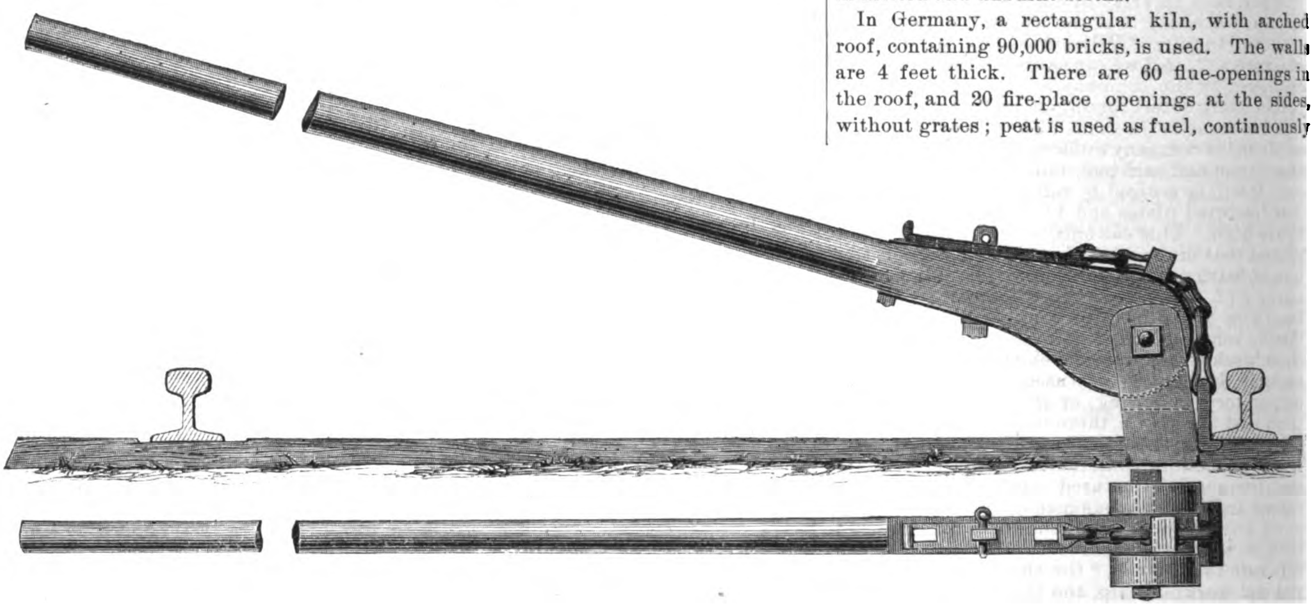
MONS. L. PASTEUR, of Paris, proposes an improvement in brewing processes. He conducts the wort of beer in a boiling state into vats or receivers cooled by a current of water in a current of carbonic acid gas. The wort is then put into a state of fermentation. Small quantities of air may be allowed to enter the apparatus if the air is first burnt to destroy any germs contained in it. The beer after its first fermentation may be drawn off into casks to complete the process, or finished in the fermenting vats.

LITERARY men, who have made patient researches in the matter, are pretty well united in the opinion that the first book printed on this continent was by Combeyer, in Mexico, in the year 1544.

Langdon & Sons' Track-raiser.

THE accompanying engravings, Fig. 1, a side, and Fig. 2, a plan, view, illustrate an implement patented by Langdon & Sons, of Burlington, Iowa, and designed for lifting or raising the rails of a railway track when the same have become depressed by the settlement of the cross-ties from the weight of the trains which have passed over them. When that occurs, it is impossible to tamp the ballast under the ties so as to raise the track permanently without first lifting it up so that the earth, gravel, or stone can be rammed under them.

The lever-like action of the apparatus when in use, and the general arrangement of its parts, are so fully shown in the engravings (taken from the *Railroad Gazette*) as to need no detailed description. The advantage which is claimed for it over every other similar implement is its exceeding simplicity and the facility with which it can be operated. It is only necessary to place it in the proper position in relation to the track, and then attach the hook to the base of the rail. One man, by throwing his weight on the end of the lever, can then raise any part of a track sufficiently to enable the repair-men to tamp the ballast under the ties.



LANGDON & SONS' TRACK-RAISER.

The inventors state that "on a single line of track one man can handle this lever and raise for sixty or more men to tamp, and do it easily. Two men can raise yard-tracks and switches from a compact bed of several years' make, if not frozen."

Terro-metallic Ware.—Blue Bricks.

TERRO-METALLIC ware is of a dense, vitreous, non-absorbent, very hard and durable body. It is for some purposes superior to the best stone, and is particularly adapted for road and stable pavements, copings, tiles, channel courses, solid walls, and hydraulic constructions. The tiles resemble cast-iron in hardness and exceed it in durability, as incapable of rusting.

The material used is a natural clay, highly impregnated with iron, and sometimes with lime, and is more fusible than ordinary brick-clay. Clays which contain a large portion of elements soluble in chlorhydric acid are good for this purpose. Where these are not obtainable, lime and iron, in the shape of slag ground, are mixed with a fat clay. In England, chalk-dust, sifted coke-dust, and mill-cinder are used. Pugging and molding is done by machinery.

The firing requires a high vitrifying temperature, and fuel is a heavy item, unless kilns on the continuous principle are used. A kiln with down-draught flame, from which the waste gases are conducted to a second kiln, is found economical by Eckhardt.

The same substance will produce an ordinary red brick, blue ware, or a glass, according to the mode and degree of firing. For terro-metallic ware, the heat is first brought to a point at which the ware begins to soften and run together, then lowered to dark-red, again raised and lowered many times.

Wood and clean peat are best; coking coal is hard to manage, as the intermittence in heat is obtained by successive heavy charges of fuel, which are allowed to burn low.

In Holland, the firing is roughly done in open kilns, with walls 6 feet thick and 12 feet high. 100,000 bricks are burnt at a time, requiring often six weeks. This method gives considerable loss in melted and unburnt bricks.

In Germany, a rectangular kiln, with arched roof, containing 90,000 bricks, is used. The walls are 4 feet thick. There are 60 flue-openings in the roof, and 20 fire-place openings at the sides, without grates; peat is used as fuel, continuously at first for 8 days, then charged intermittently every 4 hours for 4 days, and finally every 2 hours for 2 days. During the last period the flame issues abundantly from the roof.

At Rouen, the Hoffman annular kiln is used.

Blue bricks are abundantly made in Staffordshire from a ferruginous clay which fuses at a china biscuit heat.

The blue color does not permeate the body as for terro-metallic ware, but only extends to about one-eighth of an inch from the surface. The fire is managed in a series of "pinches," but requires to be less intense. The blue color is obtained by repeatedly submitting the ware when highly heated to a reducing atmosphere of smoke, which reduces the red peroxyd of iron to protoxyd, all the salts of which are bluish and greenish. Sulphur assists this action.

In Holland, the process consists in closing the dampers, and throwing bundles of wood into the fire shortly before the end of the firing.—*Beckwith's Report on Pottery, London Exposition*, 1871.

Two million dollars' worth of old Japanese gold coin arrived at San Francisco by the *America*, to be assayed for recoinage under the new standard.

The Hartford Steam-boiler Inspection and Insurance Co.

THE Hartford Steam-boiler Inspection and Insurance Company makes the following report of its inspections in the month of March, 1872:—

During the month, 896 visits of inspection were made, and 1,870 boilers were examined—1,794 externally and 589 internally; while 174 were tested by hydraulic pressure. The number of defects in all discovered, 1,113, of which 271 were regarded as dangerous. These defects in detail are as follows:—Furnaces in bad condition, 45—12 dangerous. Fractures of plates, 122—63 dangerous. Burned plates, 78—30 dangerous. Blistered plates, 130—13 dangerous. Sediment and deposit, 110—18 in dangerous condition. Incrustation and scale, 193—17 dangerous. External corrosion, 73—17 dangerous. Internal corrosion, 25—7 dangerous. Internal grooving, 15—3 dangerous. Water-gauges defective, 59—8 dangerous. Blow-out defective, 19—5 dangerous. Safety-valves overloaded and in dangerous condition, 32. Pressure-gauges defective, 147—19 dangerous, these varying from —20 to +10. Boilers without gauges, 9. Deficiency of water, 16—4 dangerous. Broken braces and stays, 60—30 dangerous. Boilers condemned, 12.

When such an array of defects and defective fittings as the above is presented, we are aware that some will inquire, "What proof have we that they are correct?" All we can say is that each inspector employed by the company is required to make report of every defect coming under his notice, and to sign his name to the same. These reports are kept on file in the company's office, and can be referred to at any time, and each individual defect can be traced out. It will be noticed by reference to these reports that fractured plates and blistered plates usually figure high. This can only be accounted for on the ground that much of the iron used in the construction of boilers is of inferior quality. In a recent number of *The Locomotive*, we remarked at some length on the subject of laminated iron, showing that, in consequence of that condition, blisters and other weaknesses were developed in the plates of boilers. If care is not used in piling the bars preparatory to rolling, or if the bars are not free from rust and scoria, there will be imperfect welding of the parts, and consequent weakness. It is true that boilers constructed of the best of iron are frequently fractured and nearly or quite ruined from injudicious management. Requiring more work from a boiler than it is constructed to bear, is a fruitful source of trouble. The only safe rule to follow is, "Get the best, both in material and workmanship, and take good care of it."

SMOOTHING-IRONS are a frequent subject of proposed improvement, and we note two of foreign origin. In one of these the iron is made hollow or of box form with a grating, on which fuel is placed, air for combustion being admitted through apertures at the rear end, covered by a rotating adjustable regulator. The air on entering is deflected by a partition, so as to cause it to pass up through the fuel on the grating. The gases of combustion escape through a hollow support for the handle, mounted on a top or covered hinge to the box. In the other, the invention comprises box-irons heated by gas, and the novelty consists in making the iron with two polished faces and capable of axial revolution, so that while one of the faces is being used the other is being heated. The iron is heated internally by a jet or by jets of gas; it is supported by and turns between the two uprights by which it is connected to its handle, being reversed and fixed by a lever at its fore end.

BALL-PROOF cuirasses of various kinds have from time to time been suggested. The inventor of the most recent (an English invention) claims making the cuirass of two sheets of galvanized leather, and between these a layer of beaten hemp and burgundy pitch intimately fixed. This plastron-cuirass is provided with braces, and a waist-belt may be worn beneath the tunic, and used as well by infantry as by cavalry; it lends itself to every movement of the body, and is exceedingly light.

The Manufacture of Toys.

AT a recent meeting of the Royal Society of Arts, in Scotland, Professor Archer read a paper on "The Manufacture of German Toys," in which he brought out some curious and interesting facts. From the figures presented, it appears that, in addition to her own manufactured toys, England exported to this continent last year foreign-made toys to the value of over £15,700, while for the amusement of her own children England pays over £200,000 to her Continental neighbors. It would be a curious and interesting study to trace out the cause of this, for it involved considerations not apparent at first sight. The productive industry which is able to spare us toys to the value of nearly a quarter of a million, and which probably supplied the rest of the world with at least as much more, was not the work of great manufactories, aided by extensive machinery, but was chiefly the result of habits of industry which led the peasantry of Germany to feel a pleasure in thus employing their leisure in the long winter evenings. Amongst the countries named as the places of export of toys to this and other countries was Holland, which sent the largest quantity, and hence such toys as are not uncommonly called Dutch toys. They are not, however, made in Holland, but principally in the hamlets of the great Thuringian Forest and the agricultural districts of Franconia, especially those in the vicinity of the quaint old city of Nuremberg, to which the toys were brought by the collecting agents to be packed and transmitted to all parts of the world. The toys made in Franconia are chiefly metal. Paste toys are chiefly made in Saxony. They are cast in molds. Though cheap, these toys are not in very great favor, owing to their being very easily broken, and their brilliant colors very often tempt children to suck them, to the great and reasonable horror of all parents who have heard of the poisonous qualities of many of the most showy pigments. The leaden toys, in the form of companies of soldiers on a very rapid march, judging from the extensive projection of their right legs, are chiefly made in Prussia, and perhaps helped in the military education of that nation of soldiers. But the most interesting feature, and that which induced Professor Archer to bring so unusual a subject before a learned society, was their manufacture, to a large extent, by the German peasantry. He specially pointed out how ingeniously the Saxon peasants, with a very primitive lathe, made all the animals, or, rather, representations of animals, which filled those wonderful Noah's arks which we receive in such vast numbers from them, and at prices so low that we were amazed until we knew by what ingenious devices they were produced. They were all produced by turning on a lathe. An elephant, a horse, and even the human figures, are all lathe-turned. A section of fire-wood of the proper size is taken and turned into a ring of varying contour, which, when shown in section, represents a particular animal or part of an animal. In that way the arks are filled, and, according to the size and number of the animals contained in them, they vary in price from a penny to half a sovereign. Other toys, such as large soldiers, are also produced by turning, and more pretentious objects, such as a vase with rings, are really master-pieces of lathe-work.—*Exchange.*

Mineral Product of Germany in 1870.

THE total production of coal in Germany in 1870 was 23,000,000 tuns, raised by 107,682 workmen, and representing a value of £6,000,000 at the pit's mouth. Of this quantity 5,859,000 tuns were raised in Upper Silesia, 1,570,000 in Lower Silesia, 11,760,000 in Westphalia, 890,000 in the Aix-la-Chapelle district, and 2,780,000 in the Saar district. The production of lignite and brown coal was 6,116,000 tuns, of a value of £866,000, principally from Prussia and Saxony; iron ore and ironstone, 2,660,000 tuns; zinc ore, 363,000 tuns: lead ore, 98,850; manganese ore, 11,200; iron pyrites, 73,800; phosphorite, 25,000; rock salt, 2,000,000 tuns. The production was raised at 2,432 works by 181,770 workmen.

THE man who a few years ago went into the sugar-cane business became very much reduced in *sorghumstances.*

METAL MARKET.

[*Corrected weekly for the "American Artisan."*]

NEW YORK CITY, Saturday, April 20, 1872.

COPPER.

Duty: Pig and Bar 5c. and Sheathing 4c. per lb.

American Ingot	$— 44	@	— 45
Sheathing, new (suits), per lb	— —	@	— 46
Sheathing, old	— —	@	— 36
Sheathing, yellow	— —	@	— 30
Pig, Chile	— —	@	— —
Bolts	— —	@	— 48

IRON.

Duty: Bars 1 @ 1½c. per lb.; R. R. 70c. per 100; Boiler and plate, 1½c. per lb.; Band, Hoop, and Scroll, 1½ @ 2¾c. per lb.; Pig, $7 per tun; Sheet, 3c. per lb.

Pig, English and Scotch, per tun	$50 00	@	55 00
Pig, American	50 00	@	52 00
Bar, English and American	100 00	@	105 00
Bar, Swedish, assorted grades	85 00	@	100 00
Sheet, Russia, per lb	— —	@	— 18½
Sheet, Single, D. and T. Common	— 6	@	— 7

LEAD.

Duty: Pig, $2 per 100 lbs.; Pipe and Sheet, 2½c. per lb.

German, gold	$5 90	@	6 00
Spanish, gold	5 90	@	6 00
Bar, net	9 25	@	— —
Sheet and Pipe, net	10 00	@	— —

NAILS.

Duty: Cut, 1½; Wrought, 2½; Horseshoe, 5 cents per lb.

Cut, per 100 lbs	$— —	@	6 50
Clinch	7 25	@	7 75

SHOT.

Duty: 2¾c. per lb.

Drop and Pk. (cash) per lb	— —	@	— 10½
Buck, comp. (cash) per lb	— —	@	— 11½

SPELTER (ZINN).

Duty: In Pigs, Bars, and Plates, $1 50 per 100 lbs.

Plates, gold	$7 12½	@	7 31½
" dom	— 7	@	— 11

TIN (ZINN).

Duty: Pig, Bars, and Block, 15 per cent. ad val.; Plates and Sheets, 25 per cent. ad val.

Banca, cash, per lb., gold	$— —	@	— 52
Straits, gold	— 42	@	— 43½
English, gold G	— 42	@	— 43½
Plates, I. C., cash	17 00	@	18 50
Plates I. C.	15 00	@	15 50

ZINC.

Duty: In Pigs, Bars, $1 50 per 100 lbs.; Sheets, 2½c. per lb.

In Sheets	$— 10½	@	— 11½

OFFICIAL LIST OF PATENTS

ISSUED FROM THE UNITED STATES PATENT OFFICE

For the Week ending April 16, 1872,

AND EACH BEARING THAT DATE.

[*Reported officially for the "American Artisan."*]

PATENT CLAIMS, DRAWINGS, AND SPECIFICATIONS.—*Owing to the constantly increasing number of patents issued, we have—as we must have done sooner or later—ceased to publish the Claims, and instead thereof we publish the names of the patentees, with the titles of their inventions, with descriptions on another page of some of the more important inventions; but we are prepared to furnish immediately on application, or by return mail, when requested by letter, a copy of the claims of any existing patent, for - 75 cents. We also furnish a printed copy of the whole specification of any patent issued since November 20, 1866, for - - $1 25 We will also supply a sketch of the parts claimed in any patent, or a full copy of the drawing thereof, at charges varying from $1 upwards.*

ADVICE TO INVENTORS AND PATENTEES.

Whenever asked, we will promptly send, gratis, our recently published pamphlet, entitled "IMPORTANT INFORMATION FOR INVENTORS AND PATENTEES," *containing details of the proceedings necessary to be taken by inventors desirous of obtaining Letters-Patent in the United States. Also, Instructions to Patentees concerning Re-issues, Extensions, Infringements, Foreign Patents, etc.*

Address BROWN, COOMBS & CO., *Solicitors of American and Foreign Patents, 189 Broadway, New York.*

125,655.—INKING APPARATUS FOR COLOR-PRINTING.—Leopold Biddle, Knoxville, Iowa.

125,656.—MANUFACTURE OF FUEL.—David E. Breinig, assignor to Anna Sophia Breinig, Mary R. Breinig, and Leonard Richardson, Brooklyn, N. Y.

125,657.—HINGE FOR TABLES.—Mathias C. Brinser, assignor of one-half his right to John M. Keiper, Lancaster, Pa.

125,658.—PROCESS FOR BLEACHING PAPER-PULP.—John Campbell, Chatham Village, N. Y.

125,659.—FLY-NET FOR HORSES.—Joseph Cantner and Daniel W. Ziegler, Millheim, Pa. Ante-dated March 29, 1872.

125,660.—CHURN.—Robert Carmack, Marengo, Ill.

125,661.—MECHANISM FOR ADJUSTING ROLLER-STANDS IN SPINNING MACHINES.—William T. Carroll, assignor to Simeon S. Cook, Woonsocket, R. I.

125,662.—WATER-WHEEL.—John C. Clime, assignor to himself, John A. Seeds, and Allen Middleton, Jun., Philadelphia, Pa.

125,663.—FIRE-ARRESTER.—George W. Cook, Geneseo, Ill.

125,664.—ENVELOPE.—Calvin Crowell, assignor to himself and Valentine G. Edwards, Syracuse, N. Y.

125,665.—BRAKE FOR RAILWAY CARS.—Jesse Darling, Whistler, Ala.

125,666.—MANUFACTURE OF ROD-SOLDER.—Ferdinand Deming, Waterbury, Conn.

125,667.—CYLINDER FOR WASHING MACHINES.—William James Dodge, assignor of one-half his right to Samuel A. Seager, Syracuse, N. Y.

125,668.—BEER-COOLER.—Richard Dreher, Milwaukee, Wis.

125,669.—PERMUTATION LOCK.—John Farrel, New York City.

125,670.—PREPARING SURFACES OF GLASS ARTICLES.—William A. Fischer, Allegheny, Pa.

125,671.—GAME.—John M. Fletcher, Clifton, N. Y.

125,672.—LAMP-BURNER.—Samuel W. Fowler, Brooklyn, N. Y.

125,673.—RAILWAY RAIL-SPLICE.—William C. Gould, New York City.

125,674.—SUPPORT FOR SEWING-MACHINE ATTACHMENTS.—Philip Grosfeld, New York City.

125,675.—HAME.—Clark D. Hazard and Rusel Hazard, Cleveland, Ohio.

125,676.—DEVICE FOR CHANGING SPEED AND REVERSING MOTION OF PLANING AND OTHER ANALOGOUS MACHINES.—William Heckert, Newcastle, Pa.

125,677.—DEVICE FOR CHANGING SPEED IN MACHINES.—William Heckert, Newcastle, Pa.

125,678.—PRINTING-PRESS.—William Heckert, assignor of two-thirds of his right to Edward S. Durban and Daniel H. Wallace, Newcastle, Pa.

125,679.—APPARATUS FOR AUTOMATICALLY REGULATING THE FLAME OF GAS-BURNERS.—Isaac Herzberg and Abram Herzberg, Philadelphia, Pa.

125,680.—GLUE-POT.—Thomas C. Howes, Troy, N. Y.

125,681.—CULTIVATOR.—George E. Hutchinson, Cleveland, Ohio.

125,682.—PAPER-FASTENER.—John C. Jensen, Chicago, Ill. Ante-dated April 2, 1872.

125,683.—STEP-LADDER.—Melvin N. Lovell, Erie, Pa.

125,684.—STEERING DEVICE FOR CANAL-BOATS, ETC.—Elijah McCreary and John McCreary, Middletown, Pa.

125,685.—EMBALMING BIRDS.—Samuel A. Morey, Grand Rapids, Mich. Ante-dated April 3, 1872.

125,686.—DRAWING AND TWISTING-HEAD FOR SPINNING MACHINES.—Thomas Nutting, Smithfield, R. I.

125,687.—SPINDLE-BEARING, ETC., FOR SPINNING MACHINES.—Francis H. Perry, Niagara Falls, N. Y.

125,688.—MACHINE FOR DOUBLING AND TWISTING YARNS.—Francis Henry Perry, assignor of one-fourth his right to Henry S. Ware, Hans Nielson, and Daniel J. Townsend, Niagara Falls, N. Y.

125,689.—STOP-MOTION FOR WARPING MACHINES.—Francis Henry Perry, assignor of one-fourth his right to Henry S. Ware, Hans Nielson, and Daniel J. Townsend, Niagara Falls, N. Y.

125,690.—UMBRELLA-HOLDER FOR VEHICLES.—Hezekiah W. Pettibone, Attica, N. Y.

125,691.—MACHINE FOR MAKING METALLIC MOLDINGS.—Benjamin K. Price, assignor to himself and Calvin Carr, Cleveland, Ohio.

125,692.—SAFETY-PLUG FOR STEAM-BOILERS.—James R. Robinson, Boston, Mass. Ante-dated March 30, 1872.

125,693.—ELECTRICAL SAFE-PROTECTOR.—Calvin C. Rowell and William Duncan, Lebanon, N. H.

125,694.—BARREL-HEAD.—Cyrus W. Saladee, St. Catharines, Canada, assignor to himself and L. Dobbins, Erie, Pa.

125,695.—WRENCH.—Rufus S. Sanborn, Rockford, Ill.

125,696.—HARVESTER-RAKE.—Jacob Seibel, Manlius, Ill. Ante-dated March 26, 1872.

125,697.—EVAPORATING SALT-BRINE.—George Escol Sellers, Bowlesville, Ill.

125,698.—CAR-COUPLING.—John B. Shelly, Richland Township, Pa.

125,699.—MEAT-CUTTER.—Isaac Siegrist, Steinsburg, Pa.

125,700.—CONSTRUCTION OF BARGES.—Antes Snyder, Freeport, Pa. Ante-dated April 13, 1872.

125,701.—WAGON-BODY.—Jacob Sommer and James S. Whitmire, Metamora, Ill.

125,702.—GAUGE FOR BUTTON-HOLE CUTTERS.—Greenleaf Stackpole, Elizabeth, N. J.

125,703.—FRUIT-DRIER.—George W. Stevens and John Gray, assignors to said Stevens, San Francisco, Cal.

125,704.—LUBRICATOR FOR STEAM-ENGINES.—James S. Stewart, Philadelphia, Pa.

125,705.—POTATO-PLANTER.—Joseph L. True, Benton, Maine.

125,706.—RETICULE WICKER-BASKET.—Joseph Venet, New York City.

125,707.—VULCANIZING RUBBER.—Edward C. R. Walker and Charles McBurney, assignors to Charles McBurney, Boston, Mass.

125,708.—SEWING-MACHINE.—Enos Waterbury, assignor to the Guinness Sewing-machine Company, Stamford, Conn.

125,709.—CIGAR MACHINE.—James L. Weatherhead, Philadelphia, Pa.

125,710.—HARVESTER-RAKE.—Harrison Wells, Erieville, N. Y.

125,711.—HARVESTER.—Harrison Wells, Erieville, N. Y.

125,712.—CURTAIN-FIXTURE.—John F. Wollensak, Chicago, Ill. Ante-dated March 30, 1872.

125,713.—CLOTHES-DRIER.—George W. Ainsworth, Waterbury, Vt.

125,714.—MEDICAL COMPOUND FOR PHOSPHATED CANDIES.—Charles S. Allen, New York City.

125,715.—PAIL.—Charles W. Bartlett, New York City.

125,716.—METALLIC TELEGRAPH-POLE.—Francis Boyd, Newburg, N. Y.

125,717.—BOOT AND SHOE.—Thomas Winship Brown, Malden, assignor to himself, Nathaniel L. Francis, and Andrew J. Mallon, Boston, Mass.

125,718.—ATTACHING SHOES TO SLEIGH-RUNNERS.—Gilbert Budd and Gabriel T. Daved, Phillipsport, N. Y.

125,719.—CHARGER FOR SHOT-POUCHES.—Joseph T. Capewell, Woodbury, Conn.

125,720.—SPADE-BAYONET AND BAYONET-FASTENING.—Felix Chillingworth and Ira Merrill, Springfield, Mass.; said Merrill assignor to said Chillingworth.

125,721.—BALING COTTON, ETC.—Benjamin W. Collier, Oxford, assignor to himself and W. H. Ford, Vaiden, Miss.

125,722.—GUIDING APPARATUS FOR CLOTH-SHEARING MACHINES.—Laroe M. Collins, Lebanon, N. H., assignor to Amasa Woolson, Springfield, Vt.

125,723.—MEDICAL COMPOUND OR COUGH-MIXTURE.—Matthew Connel, Jersey City, N. J.

125,724.—CENTRIFUGAL MACHINE FOR GRINDING SUGAR.—Jonathan Cottle, Boston, Mass.

125,725.—VENTILATOR FOR HATS.—William Dale, New York City.

125,726.—ORNAMENTAL MIRROR, ETC.—William M. Davis, Brook Haven, assignor to himself and Sidney S. Norton, Brooklyn, N. Y.

125,727.—HUB FOR CARRIAGE-WHEELS.—Jacob Dump and Albert Moore, Kingston, Ohio.

125,728.—STEP-LADDER.—William J. Emens, St. Louis, Mo.

125,729.—SHIP'S BERTH.—John Evans, Denver, Col. Ter.

125,730.—WATER-WHEEL.—James A. Fairbanks, Augusta, Maine.

125,731.—ALARM DOOR-BELL.—Charles C. Gerhardt and Gilbert S. Lander, Wyandotte, Kan.

125,732.—CLOD-FENDER.—Robert T. Gillespie, Millport, Ohio.

125,733.—DIP-PIPE IN HYDRAULIC MAINS FOR GAS-WORKS.—James Hannan Gallipolis, assignor to himself and Robert T. Coverdale, Cincinnati, Ohio.

125,734.—LOCKING KNOB-LATCHES.—Francis Hegner, Boston, Mass.

125,735.—BAKER'S OVEN.—Charles F. Holmes, St. Louis, Mo.

125,736.—APPARATUS FOR MIXING SOAP.—Horace N. Humiston, Troy, N. Y.

125,737.—TOOL FOR REMOVING THE ROLLER FROM AND REPLACING IT UPON THE BALANCE-SHAFT.—James Ingram, Troy, N. Y.

125,738.—CLOTHES-BEATER.—Alden Jameson, Boston, Mass.

125,739.—TOOL FOR FORMING SCREW-THREADS IN THE NECKS OF GLASS BOTTLES.—Goveneur M. Keeffer, East Birmingham, Pa.

125,740.—APPARATUS FOR MOLDING HOLLOW ARTICLES FROM PAPER-PULP.—John L. Kendall, Foxborough, Mass., and Richard H. Treated, New York City.

125,741.—BALING PRESS.—Wendell R. King, Chicago, Ill.

125,742.—RAIN-WATER CUT-OFF.—Thomas Lee, Cincinnati, Ohio.

125,743.—STAND FOR TESTING FIREARMS.—Julius Lehnert, Louisville, Ky.

125,744.—SAIL-HANK.—D. Granville Low, Chelsea, Mass.

125,745.—MITERING MACHINE.—Harry Malin, George W. Malin, and Albert D. Malin, Pleasantville, Pa.

125,746.—HARVESTER.—John P. Manny, Rockford, Ill.

125,747.—HARVESTER-RAKE.—John P. Manny, Rockford, Ill.

125,748.—ROTARY ENGINE.—Gideon B. Massey, New York City.

125,749.—PNEUMATIC SPRING.—Matthew F. Maury, Richmond, Va.

125,750.—HEAD-BLOCK FOR SAW MILLS.—Henry C. McEwen, Oakdale Station, Pa.

125,751.—DIE FOR FORMING FELLY-PLATES.—Francis B. Morse, assignor to H. D. Smith & Co., Plantsville, Conn.

125,752.—MODE OF HARNESSING HORSES.—John Murray, Jun., Worcester, Mass.

125,753.—WAGON-WRENCH.—Roland J. North, assignor to himself and B. B. North, Cornwall, Conn.

125,754.—GLASS GLOBE OR RESERVOIR FOR LAMPS.—Adolph Otto, New Braunfels, Tex.

125,755.—VENTILATOR FOR WINDOWS.—George W. Pell, New York City.

125,756.—TRUNK-GUARD.—Fred. Peterson, Rockford, Ill.

125,757.—SPITTOON CHAIR.—Antonio Quirolo, New York City.

125,758.—SAW MILL.—John J. Reinhart and William Houghton, Loogootee, Ind.

125,759.—CENTER-BIT.—William H. Richards, Deerfield Corners, N. Y.

125,760.—MODE OF DRESSING MILLSTONES.—Thomas Rogers, assignor to himself and J. C. Price, Leesville, Ohio.

125,761.—FENCE.—William Post Rollo, Holland Patent, N. Y.

125,762.—REVERSIBLE AXLE-SKEIN.—Andrew F. Smith, Aiken, Tex.

125,763.—IMPLEMENT FOR RULING SLATES.—Ferdinand Soehner, Hamilton, Ohio.

125,764.—PLUG FOR LEAKY BOILER-TUBES.—John M. Spiegle, Philadelphia, Pa.

125,765.—MOLDING CUTTER-HEADS.—Daniel Stanley, assignor to himself and Henry Doane, Cincinnati, Ohio.

125,766.—STRAP MACHINE.—Aaron F. Stowe, Worcester, Mass.

125,767.—ROCKING-CHAIR.—Charles Streit, Cincinnati, Ohio.

125,768.—MACHINE FOR SAWING STAVES.—Nicholas J. Templeton, assignor to himself and Henry C. Ezekiel, Cincinnati, Ohio.

125,769.—VALVE-GEAR FOR STEAM-ENGINES.—Joseph N. Tift and William Love, Buffalo, N. Y.

125,770.—HARNESS-SADDLE.—Samuel E. Tompkins, Sing Sing, N. Y.

125,771.—TELEGRAPH-POLE.—Alfred Homer Trego, Philadelphia, Pa.

125,772.—TOP-PROP FOR CARRIAGES.—David M. Valentine, New York City.

125,773.—OSCILLATING ENGINE.—John W. Van Sant, Perth Amboy, N. J.

125,774.—SEWING-MACHINE.—Eugene A. Weeks, Cincinnati, Ohio.

125,775.—BREECH-LOADING FIREARM.—Andrew E. Whitmore, Ilion, N. Y.

125,776.—BEE-HIVE.—Harmon K. Wilson, Barboursville, Ky. Ante-dated April 10, 1872.

125,777.—STEAM-BOILER FURNACE DOOR-WAY.—William S. Wood, Newtown, N. Y.

125,778.—ORGAN.—George Woods, Cambridgeport, Mass.

125,779.—LIFE-PRESERVING MATTRESS.—John Adams, Gloucester, N. J.

125,780.—BELT-TIGHTENER.—Homer C. Allyn, Falls Village, Conn.

125,781.—EARTH-CLOSET.—James A. August, Hot Springs, Va.

125,782.—TUCK CREASING ATTACHMENT FOR SEWING-MACHINES.—Sylvester P. Babcock, Adrian, Mich.

125,783.—BED-BOTTOM.—David E. Bishop, Baltimore, Md.

125,784.—LIFTING-JACK.—John S. Bodge, La Porte, Ind.

125,785.—LAMP-BRACKET AND REFLECTOR.—Emil Boesch, San Francisco, Cal.

125,786.—BALING SHORT-CUT HAY OR STRAW.—Charles Brown, New York City.

125,787.—MANUFACTURE OF INDIA-RUBBER ROLLS.—Wheeler Cable, Boston, Mass.

125,788.—HAND-STAMP.—Edmund D. Chamberlain, New York City.

125,789.—ROPE-CLAMP.—Thomas J. Clark and George M. Clark, Higganum, Conn.

125,790.—SASH-HOLDER.—Peter Conver, assignor of one-half his right to Elias Potter and Silas V. Crandall, Farmington, Ill.

125,791.—GRINDING-MILL.—Alexander Crease, Cleveland, Ohio.

125,792.—VALVE-COCK AND FAUCET.—Alfred Crossley, Philadelphia, Pa.

125,793.—WATER-METER.—(Div. A.)—José F. De Navarro and Henry C. Sergeant, assignors to José F. De Navarro, New York City.

125,794.—LIQUID-METER.—(Div. B.)—José F. De Navarro and Henry C. Sergeant, assignors to José F. De Navarro, New York City.

125,795.—BAG-TIE.—John W. H. Doubler, assignor to himself and William Logue, Darlington, Wis.

125,796.—SPRING FOR VEHICLES.—Richard Dudley, Erie, Pa.

125,797.—SEPARATOR FOR ORES, GRAIN, ETC.—Leon Duvall, assignor to himself and George W. Lord, Philadelphia, Pa.

125,798.—FORMING BLOCKS FOR PAVEMENTS.—George L. Eagan, San Francisco, Cal.

125,799.—LOCK-COCK.—Henry Essex, Meadville, Pa.

125,800.—FENCE.—Edward Fales, Glenwood, Mo.

125,801.—BEDSTEAD-FASTENING.—James R. Finley and Lewis Martin, Delphi, Ind.

125,802.—BORING MACHINE.—Jacob Gardner, Bigler, Pa.

125,803.—MACHINE FOR BORING HUBS AND TENONING SPOKES.—Jacob Gardner, Bigler, Pa.

125,804.—MODE OF CUTTING STONE.—Alonzo S. Gear, Boston, Mass.

125,805.—FLUID-METER.—John H. A. Gericke, Hoboken, N. J.

125,806.—TELEGRAPH-SOUNDER.—Miles W. Goodyear, Chicago, Ill.

125,807.—SEWING-MACHINE.—James Gordon and William E. Kinert, Bluffton, Ind.

125,808.—DOOR-CATCH FOR RAILROAD-CARS.—Charles Graham, Kingston, Pa.

125,809.—MACHINE FOR TRANSMITTING MOTION.—Charles P. Grout, New York City.

125,810.—RAG-WASHING CYLINDER.—George W. Hammond and Thomas J. Foster, Westbrook, Maine.

125,811.—COTTON-CHOPPER AND CULTIVATOR.—James M. Harcrow, Marshall, Tex.

125,812.—COMPOUND ENGINE.—Andrew Hartupee, Pittsburg, Pa.

125,813.—PORTABLE OIL-CAN.—Charles J. Hauck, Brooklyn (E. D.), N. Y.

125,814.—CURBING FOR STREETS.—David Herr, Lock Haven, Pa.

125,815.—CARPET-BEATER.—James Hothersall, New York City.

125,816.—HARVESTER.—Jerome P. Humphreys, Nashville, Tenn.

125,817.—BUGGY-BODY.—Charles P. Kimball, Portland, Maine.

125,818.—VACUUM PUMP.—Carl Franz Leopold, Philadelphia, Pa.

125,819.—FLOUR-BOLT.—Ira B. Lewis, Belvidere, Ill. Ante-dated April 6, 1872.

125,820.—ICE-HOUSE.—Charles Liebmann, Brooklyn (E. D.), N. Y.

125,821.—WINDMILL.—Edgar C. Little and Edwin D. Little, Shabbonas Grove, Ill.

125,822.—STRAW-CUTTER.—Thomas E. Marable, assignor of one-half his right to Stark A. Plummer, Petersburg, Va.

125,823.—GAUGE.—John A. Marden, Veazie, Maine.

125,824.—Hand-pump.—Thomas J. Mayall, Boston, Mass.

125,825.—Suspended.

125,826.—Window-frame.—Francis McStocker, Philadelphia, Pa.

125,827.—Revolving Extension-table.—Frederick Menzer, assignor of one-half his right to George T. Warren, Flint, Mich.

125,828.—Boring Machine.—John L Metcalf, Quincy, Pa.

125,829.—Breech-loading Firearm.—Isaac M. Milbank, Greenfield Hill, Conn. Ante-dated April 13, 1872.

125,830.—Metallic Cartridge.—Isaac M. Milbank, Greenfield Hill, Conn. Ante-dated April 5, 18.2.

125,831.—Composition Pavement and Foundation for the Same.—George H. Moore, Norwich, Conn.

125,832.—Kiln for burning Bricks, Tiles, etc.—Augustus Morand, Brooklyn, N. Y.

125,833.—Hemmer for Sewing-machines.—Aaron Morehouse, assignor to himself and Alfred R. Heath, Danbury, Conn.

125,834.—Lady's Boot.—Daniel H. Murphy, assignor to William A. Dole, Lynn, Mass.

125,835.—Reducing and separating Gold and other Metals from Ores.—Charles M. Nes, Baltimore, Md.

125,836.—Fare-box.—Carlton Newman, assignor to himself, George P. Kimball, and R. L. Ogden, San Francisco, Cal.

125,837.—Bee-hive.—Charles S. Newsom, Gallipolis, Ohio.

125,838.—Steam-engine.—Albert T. Nichols, Williamsport, Pa.

125,839.—Tongue Support.—By Nunamacker, Earlham, Iowa.

125,840.—Carriage-wheel.—James O'Connor, assignor of one-half his right to Lowndes H. Davis, Jackson, Mo.

125,841.—Lubricating Car-axle.—William Painter, assignor of one-half his right to Lewis R. Keizer, Baltimore, Md. Ante-dated April 3, 1872.

125,842.—Paper Collar and Cuff.—Herman Parmenter, assignor to himself and A. Bechtel, New York City. Ante-dated April 6, 1872.

125,843.—Steam-harvester.—Robert C. Parvin, Philadelphia, Pa.

125,844.—Corner-bead for Plastering.—Erving F. Rice, assignor to himself and Robert S. Griffin, Worcester, Mass.

125,845.—Fence.—John H. Ruckman, assignor to Cicero B. Brooke, Cartersville, and David V. Ruckman, Mill Gap, Va.

125,846.—Thill-coupling.—Clark S. Sanford, Lena, Ill.

125,847.—Corn-planter.—Morriss Schnapp and William J. Hollis, De Witt, Mo.

125,848.—Liquid-meter.—Henry C. Sergeant, assignor to José F. De Nevarro, New York City.

125,849.—Glass for Lanterns and Lamps.—Martin Van Buren Shaver, Adrian, Mich.

125,850.—Gas-heater.—Gibson Smith, Ayer, Mass.

125,851.—Pillow and Bolster.—Timothy S. Sperry, Chicago, Ill.

125,852.—Lamp.—William Staehlen, assignor to Charles F. A. Hinrichs, Brooklyn (E. D.), N. Y.

125,853.—Apparatus for rendering Animal Matters.—Michael J. Stein, New York City.

125,854.—Apparatus for rendering and drying Animal Matters and burning the Gases.—Michael J. Stein, New York City.

125,855.—Railroad-car Ventilator.—William C. Stickney, Steubenville, Ohio.

125,856.—Process and Apparatus for separating the Extractive Matters from Various Substances.—George W. Sylvester, Belleville, N. J.

125,857.—Piston-packing.—Jesse H. Teal, Memphis, Tenn.

125,858.—Try-square.—Justus A. Traut, assignor to the Stanley Rule and Level Company, New Britain, Conn.

125,859.—Picture-nail.—John Uster, Brooklyn (E. D.), N. Y.

125,860.—Garbage and Slop Pail.—Cornelius T. Voss, Stapleton, N. Y.

125,861.—Implement for regulating Watches.—Louis Walldorf, Rochester, N. Y.

125,862.—Combined Collar and Muff.—Martin Wannagat, New York City.

125,863.—Tuyere.—Andrew Warren, St. Louis, Mo.

125,864.—Water-closet.—William Jacob Warren, Philadelphia, Pa.

125,865.—Sleigh-runner.—Benjamin F. Watson, Farmington, Maine.

125,866.—Band for securing Bottle-fastenings.—Ephraim D. Weatherbee, Shrewsbury, assignor to himself and Alden A. Tarbell, Hudson, Mass.

125,867.—Hand-mirror.—William M. Welling, New York City.

125,868.—Nickle-plated Articles.—Joshua A. Whitman and Nathaniel M. Neal, assignors to the Auburn Foundry and Manufacturing Company, Auburn, Maine.

125,869.—Bobbin-winder.—Elihu Wilder, Springfield, Mass.

125,870.—Curtain-fixture.—John F. Wollensak, Chicago, Ill.

125,871.—Horizontal-flue Steam-boiler.—Burrel G. Wood, Nashville, Tenn.

125,872.—Cultivator.—Jack Wood, Wedowee, Ala.

125,873.—Lighter for Vessels.—John E. Worthman, Mobile, Ala.

125,874.—Parlor-match.—Frederick Zaiss, Philadelphia, Pa.

125,875.—Machine for lining Percussion-caps.—Andrew J. French, Waterbury, Conn., assignor to Ambrose I. Upson, New York City.

RE-ISSUES.

4,868.—Engine operated by Heated Liquids.—James S. Baldwin, Newark, N. J. Patent No. 121,450, dated Dec. 5, 1871.

4,869.—Top-prop for Carriages.—Frederick A. Bradley, assignor, by mesne-assignments, to James G. English and Edwin F. Mersick, New Haven, Conn. Patent No. 82,203, dated Sept. 15, 1868.

4,870.—Fastening Sheet-metals to Roofs.—Asa Johnson, assignor of two-thirds interest to Thomas S. Sanford, New York City. Patent No. 17,331, dated May 19, 1857; extended seven years.

4,871.—Loop for Harness.—Addison M. Osborn, Girard, Pa. Patent No. 118,046, dated Aug. 15, 1871.

4,872.—Seal for Locks.—Franklin W. Brooks, assignor to American Seal Lock Company, New York City. Patent No. 99,831, dated Feb. 15, 1870.

4,873.—Apparatus for molding and clarifying Horn.—Edward F. Coffin, assignor to Carr, Brown & Co., Newburyport, Mass. Patent No. 101,587, dated April 5, 1870.

4,874.—Steam-pump.—Lewis Griscom, assignor to himself, Chalkley Griscom, and John P. Griscom, Port Carbon, Pa. Patent No. 124,679, dated March 19, 1872.

4,875.—Cultivator.—Reuben M. Melton, Criglersville, Va Patent No. 24,227, dated May 31, 1859.

DESIGNS.

5,767.—Carpet-pattern.—Thomas Barclay, assignor to Lowell Manufacturing Co., Lowell, Mass.

5,768.—Carpet-pattern.—Montagu Blatchford, Halifax, England, assignor to Joseph Wild & Co., New York City.

5,769.—Breastpin.—Anton V. Bock, Chicago, Ill.

5,770.—Carpet-pattern.—John H. Bromley, Philadelphia, Pa.

5,771.—Carpet-pattern.—Robert R. Campbell, assignor to Lowell Manufacturing Co., Lowell, Mass.

5,772 to 5,774.—Carpet-pattern.—Joseph M. Christie, assignor to Lowell Manufacturing Co., Lowell, Mass.

5,775.—Carpet-pattern.—Paul Chorier, Paris, France, assignor to Joseph Wild & Co., New York City.

5,776.—Steam-engine.—Chillon M. Farrar, Buffalo, N. Y.

5,777.—Badge.—Michael Feely, Providence, R. I.

5,778 to 5,781.—Carpet-pattern.—John Fisher, Enfield, assignor to Hartford Carpet Co., Hartford, Conn.

5,782.—Carpet-pattern.—Otto Heinigke, New York City, assignor to Hartford Carpet Co., Hartford, Conn.

5,783.—Shawl Fabric.—Joseph Hodgson, assignor to Thomas Dolan, Philadelphia, Pa.

5,784 to 5,786.—Carpet-pattern.—Henry Horan, Newark, N. J., assignor to Hartford Carpet Co., Hartford, Conn.

5,787.—Carpet-pattern.—Louis Jullien, Passy, France, assignor to Joseph Wild & Co., New York City.

5,788.—Carpet-pattern.—Levi G. Malkin, New York City, assignor to Hartford Carpet Co., Hartford, Conn.

5,789 to 5,791.—Carpet-pattern.—William Mallinson, Halifax, England, assignor to Joseph Wild & Co., New York City.

5,792 and 5,793.—Carpet-pattern.—Archibald McCallum, Halifax, England, assignor to Joseph Wild & Co., New York City.

5,794.—Carpet-pattern.—David McNair, assignor to Lowell Manufacturing Co., Lowell, Mass.

5,795 and 5,796 —Carpet-pattern.—Elemir J. Ney, New York City, assignor to Hartford Carpet Co., Hartford, Conn.

5,797.—Carpet-pattern.—Joseph J. Patchett, Halifax, England, assignor to Joseph Wild & Co., New York City.

5,798 to 5,802.—Carpet-pattern.—Edward Poole, Halifax, England, assignor to Joseph Wild & Co., New York City.

5,803.—Carpet-pattern.—Herbert Robinson, Halifax, England, assignor to Joseph Wild & Co., New York City.

5,804.—Carpet-pattern.—John H. Smith, Enfield, assignor to Hartford Carpet Co., Hartford, Conn.

5,805.—Inkstand.—Levi L. Tower, Somerville, Mass.

5,806.—Flower-pot.—George P. Palmer, Boston, Mass.

TRADE-MARKS.

765.—Suspended.

766.—Removable Tops for Riding-boots.—Charles H. Colburn, Milford, Mass.

767.—Fine-cut Chewing-tobacco.—Arthur Gillender & Co., New York City.

768.—Starch.—T. Kingsford & Son, Oswego, N. Y.

769.—White-lead.—R. Lewenthal & Co., New York City.

770.—Soap.—Jesse Oakley, New York City.

771.—Axle-oil.—Charles C. Richmond, Boston, Mass.

772.—Lubricating Oil.—The Galena Oil Works, Franklin, Pa.

773.—Mowing, Reaping, and Harvesting Tools.—The Greenwoods Scythe Co., New Hartford, Conn.

774.—Corn-knife.—The Greenwoods Scythe Co., New Hartford, Conn.

775.—Perfumery, Drugs, and Medicines.—W. A. Weed & Co., Chicago, Ill.

EXTENSIONS.

19,855.—Ice-pitcher.—Ernest Kaufmann, April 6, 1858; re-issued to Henry G. Reed, George Brabrook, and Henry H. Fish, assignees of said Kaufmann, Nov. 17, 1868, and numbered 3,194.

19,824.—Apparatus for supplying and measuring Sirups in Soda-water.—Edmund Bigelow, April 6, 1858; re-issued May 4, 1858; again re-issued Dec. 4, 1866, numbered 2,406.

APPLICATIONS FOR EXTENSIONS.

Opponents of extensions must file *written* objections in the Patent Office at least 20 days before the day-of-hearing; and on that day, at noon, they must appear personally, or by proxy, at the Patent Office, and state the reasons of their opposition. All testimony—*pro* or *con*—must be taken and transmitted in accordance with the official rules, which will be furnished on application. The under-named patentees have recently petitioned for extensions (for seven years) of patents granted to them in the year 1858 :—

William H. Orr, Martin's Ferry, Ohio.—*Machine for cleaning Grain.*—Patented July 13, 1858, and re-issued Nov. 1, 1859; testimony will close on June 11, next; last day for filing arguments and examiner's report, June 21; day-of-hearing, June 26.

Horatio Allen, New York City.—*Tube-joint for Condensers.*—Patented July 20, 1858, and re-issued May 8, 1866; testimony will close on June 18, next; last day for filing arguments and examiner's report, June 28; day-of-hearing, July 3.

Joseph C. Kneeland, Northampton, Mass.—*Machinery for piling Paper.*—Patented July 27, 1858; testimony will close on June 25, next; last day for filing arguments and examiner's report, July 5; day-of-hearing, July 10.

A large owl flew into the cab of an engine on a Georgia railroad a few nights ago, and alighted upon the shoulder of the engineer, holding fast his position until the fireman picked up a billet of wood and killed him.

Letter Box

M. O., of N. Y.—You can make a cheap white paint for your out-buildings, by taking half a gallon of skimmed milk, six ounces of linseed oil, eight ounces of slaked lime, two ounces of Burgundy pitch, and three pounds of Spanish white. First mix the lime with milk enough to form a paste, then add and mix the oil and pitch, then the rest of the milk, and, lastly, the Spanish white.

G. L., of R. I.—Your arrangement of cams, spur-wheels, and connecting-rods for vibrating a harrow frame seems to us too complex for such a purpose. Otherwise your idea may possess some merit.

S. J. C., of Nevada.—The floors of your stamp mill should be arranged in steps, so that the material may pass from one apparatus to another without handling. The neglect of this is the only defect we note in your proposed plans.

U. P. M., of Vt.—We believe that "marbles" are rounded by being placed, in the form of rude fragments of stone, in a tumbling box, which, by the mutual attrition of the pieces, rounds off their corners, and finally brings them to spherical shape.

G. L. R., of N. J.—You are, perhaps, the ninetieth person who has written us concerning the fiber of milk-weed. Thus far the material has proved worthless. It is too weak for cloth, and too smooth and glassy to be readily made into paper. For this latter purpose, the fiber of the "cat-tail" flag will serve a better purpose, but it is doubtful if it can be obtained in sufficient quantities to render its utilization profitable.

N. S., of R. I.—Coarse paints for work exposed to the weather can be made with fish-oil suitably prepared for the purpose. Paints thus made are said to be durable and cheap. The mode of treating the oil would require for explanation more space than we can afford in the "Letter-box," but for your satisfaction, and also as a matter of practical consequence for many purposes, we propose to publish the method in full in a week or two.

ENGLISH PATENT JOURNAL.

LIST OF APPLICATIONS FOR PATENTS.

ON WHICH

Provisional Protections

HAVE BEEN OBTAINED IN ENGLAND BY OR FOR AMERICAN INVENTORS.

[*This list is condensed weekly from the "Journal of the British Commissioners of Patents," expressly for the* "American Artisan."]

104.—Steam-engine.—Cope & Maxwell, Cincinnati, Ohio.—Jan. 13, 1872.

773.—Roll for spinning machines.—W. A. Caswell, Providence, R. I.—March 14, 1872.

780.—Safety-boat lowering, etc., apparatus.—C. C. Quartius, Canarsie, N. Y.—March 14, 1872.

781.—Heald for weaving, etc.—D. C. Brown, Lowell, Mass.—March 14, 1872.

786.—Boot and shoe heels.—Richardson & Hacker, Providence, R. I.—March 14, 1872.

816.—Hose-coupling, etc.—W. Osborn, New York City.—March 18, 1872.

828 and 829.—Printing-telegraph.—Field & Andrews.—March 19, 1872.

830.—Apparatus for raising, etc., boats.—G. W. Mallory Mystic Bridge, Conn.—March 19, 1872.

838.—Compound for cleaning carpets, etc.—R. W. Knowles, New York City.—March 19, 1872.

894.—Steam-generator.—J. F. Allen, Mott Haven, N. Y.—March 23, 1872.

895.—Cartridge.—C. W. Lovett, Jun., Boston, Mass.—March 23, 1872.

900.—Fire-extinguishing apparatus.—W. L. Ellsworth, Brooklyn, N. Y.—March 25, 1872.

901.—Joint for covers for gas-retorts.—Floyd Deiterich and Schlissler, New York City.—March 25, 1872.

921.—Preventing corrosion of iron.—G. H. Smith, New York City.—March 26, 1872.

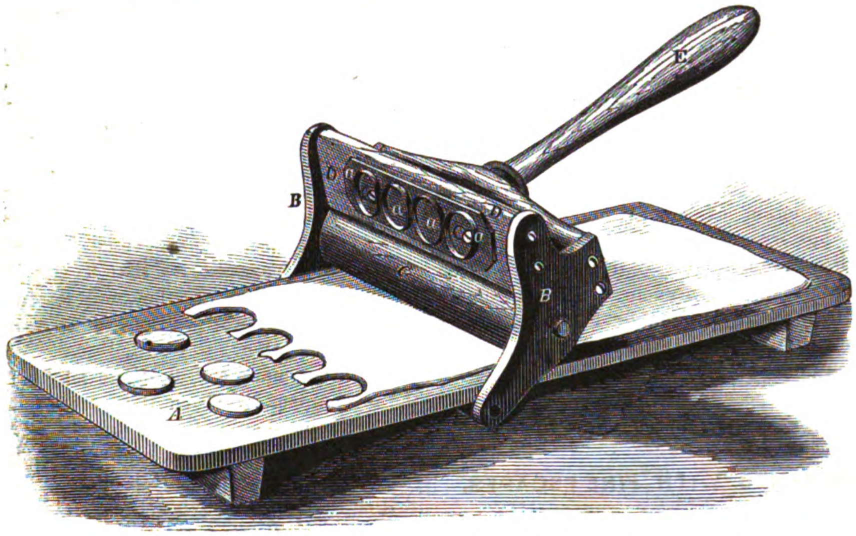
854.—Breech-loading ordnance.—Nathan Thompson, Brooklyn, N. Y.—March 21, 1872.

856.—Securing lacing-hooks in leather, etc.—H. C. Bradford, Providence, R. I.—March 21, 1872.

Rippon & Cook's Improved Pastry Machine.

The device illustrated in our engraving is designed for rolling dough into sheets, and cutting the same into forms suitable for the oven; the implement has also another use, to which reference is hereinafter more specifically made. It is termed a "pastry machine," and is the invention of William F. Rippon and Emory Cook, of Providence, R. I., who, through the "American Artisan Patent Agency," have applied for a patent thereon.

B indicates the two ends of a frame which carries a roller, C (serving, in rolling dough, the same purpose as the ordinary rolling-pin), this frame being furnished with a handle, E, by which the device is operated. The lower extremities of the end parts, B, project down past the lateral edges of a board, A, upon which the roller works, and have fitted upon their inner surfaces small rollers, one of which is indicated in dotted outline in the engraving. These small rollers running upon the under side of the board, at the edges thereof, furnish bearing in such wise that the portion of the implement above the board may, by means of the handle, be pressed down upon the same when in use, as presently explained. The end parts, B, also carry a bar, D, parallel with the roller, and furnished on its outer face with annular cutters, *a*, corresponding in shape to the forms to be cut from the sheet of dough in shaping the same for baking.



RIPPON & COOK'S IMPROVED PASTRY MACHINE.

In using the appliance, the dough, previously laid upon the board, is pressed into a flat sheet of the requisite thickness by passing the roller over it with a pressure greater or less, as occasion requires; the device, as will readily be seen, being capable of movement the entire length of the board, and that moving about its small rollers at the extremities of the end-pieces as upon a fulcrum. When the dough is brought to the desired thickness, the device is tilted forward to bring down the cutters, *a*, upon and through the dough to cut it into forms, this being done in succession until the whole is worked up. The dough may therefore be, by this device, rapidly and conveniently rolled and cut into the requisite shapes. The device, with the bar, D, and its cutters, *a*, removed, may furthermore be adapted to use for mounting card photographs, etc., when desired.

By a recent decree of the Mexican Government, foreign vessels are permitted to engage in the pearl and other fisheries on the Mexican coast, under certain specified regulations.

Our First War Steamer.

At the beginning of the present century, the navy of the young nation just rising on this continent was possessed of some of the best vessels in the world. Among them was the famous *Constitution*, which vessel is still in the service, having been stationed at the Naval Academy as a school-ship for the last ten years.

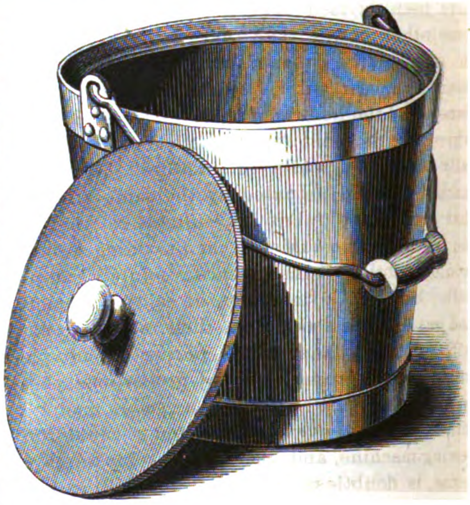
About this date the steam-engine was used to propel vessels by means of paddle-wheels. To whom really belongs the honor of applying steam as a motor for ships is a disputed point, into the discussion of which it is not desirable to enter; it is, however, pretty well settled that Fulton was the first builder of a steamboat intended for traffic. The success of this vessel was followed by great improvements in that line, and rendered possible the grand system of internal commerce for which this country is so well adapted. In 1814, the same Fulton proposed to build a floating battery for the defence of New York Harbor, the vessel to be propelled by steam, with a central paddle-wheel. This is the first known proposition to use the new motive power for war purposes. This vessel was to carry twenty guns on her gun-deck, and to make a speed of four miles per hour. In addition to her armament on deck, it was intended that she should carry two submarine guns on each bow, so as to strike an enemy below the water-line; besides this, provision was made for throwing a large body of water upon an enemy at close quarters. The ship was launched in November, 1814, in a little more than four months from the laying of the keel; by June, 1815, her machinery was in place, and a trial-trip took place in New York Bay, which was a great success. At a later period she made a trip to sea, about twenty-seven miles from New York, with all her coal and armament on board, attaining a speed of nearly six knots. This formidable craft was named by her projector the *Demologus*, but after his death she was called the *Fulton*; she was used as a receiving-ship at the New York Navy-yard after her completion until 1829, when she was accidentally blown up by the explosion of the powder in her magazine.—*Exchange.*

THE NEW YORK SOCIETY OF PRACTICAL ENGINEERING.

The stated monthly meeting of the Society of Practical Engineering took place on the evening of April 18, the President, James A. Whitney, in the chair; Robert Weir, Secretary. It comprised the reading of a paper by L. Bradley, Electrical Engineer, on "Electrical Measurement," and another by Richard H. Buell, Civil Engineer, on the "Preservation of Timber." Both papers will appear in due time in our columns. A brief address referring to the life and labors of the late Professor Morse, an honorary member of the Society, closed the proceedings for the evening.

SCHUYLER'S PATENT PAPER PAIL.

The accompanying perspective view relates to an improvement in pails made of paper, and designed to obviate the difficulty, hitherto existent in this branch of manufacture, of making the bottom of the ware in one piece with the sides. When made, as has heretofore been the practice, with the bottoms first shaped separately and attached in place in various ways, the attachment has proved defective, the pail soon becoming leaky, and, of course, its value practically destroyed. In the improved pail shown in the engraving this is obviated by the construction of the bottom and sides in one piece without break or joint, the pail being, furthermore, strengthened and protected from injury by an appropriate arrangement of metallic bands, etc.



The body of the pail, comprising the bottom and sides, is made in one piece from paper pulp, formed upon a suitable shaping apparatus, then rolled and dried, and subsequently treated with appropriate siccative oils and waterproofing material. Upon the under side of the bottom is applied a false bottom of pasteboard or the like, this being confined in position by an annular iron band, which also constitutes the bearing or support at the bottom of the pail. At the top of the latter is also applied an annular strengthening band, formed with an inwardly projecting flanch or ledge, which provides a suitable rest for the cover. The rim is, furthermore, provided with lugs for the attachment of the bail or handle by which, when desired, the pail is carried. By this construction vessels capable of sustaining without injury much rough usage are provided, the same being also light and easy to carry and handle when in use. This improvement is the invention of Mr. P. C. Schuyler, of New York City, to whom, through the "American Artisan Patent Agency," a patent was allowed April 4, 1872. The articles are manufactured by the American Papier-mache Company, 29 Barclay Street, New York City.

The Philadelphia *Ledger* says that the most independent person in the country at the present time is the skilled mechanic who works faithfully.

AMERICAN ARTISAN

BROWN, COOMBS & CO., Publishers.

ISSUED WEEKLY AT

No. 189 Broadway, New York.

H. T. BROWN. J. W. COOMBS.

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WEDNESDAY, APRIL 24, 1872

ENGINES FOR SEWING-MACHINES.

EVERYBODY knows that to run a sewing-machine continuously hour after hour is work of the severest kind, and that means should long since have been devised to drive needle and shuttle by some other power than that of the human foot. In some large manufacturing establishments steam has been employed, to the credit of the owners and the benefit of the employees. But even where this is most feasible it has not been generally adopted, while in families the sewing-machine is still actuated by the same attendant that guides the fabric into suitable relation with the thread. The difficulty of providing a motor would doubtless vanish if once resolutely grappled with; but, while inventors of caloric, ammonia, and gas engines assert that their respective plans will admirably answer the purpose, none place machines of proper size and proportions cheaply upon the market. That a small motor on either of the above-named systems would run a sewing-machine, and that, too, at moderate expense, is doubtless true. But in calling attention, as we have done more than once before, to this subject, we prefer to devote a few words to the adaptation of steam-power on a small scale to the purpose under consideration. For, if a "dollar engine" will run multitudinous toys, as some of these devices do, why would not a larger one, but yet of less size than those ordinarily made for any industrial use, operate the smoothly working moving parts of a sewing-machine? Taking a hint from the toy steam-engine, we will suppose the cylinder made of soft metal, and capable of being cast into shape in iron molds, so as to need but little finishing. Let it be of the oscillating variety, in order that the trunnions may constitute the valves, and let the whole be fixed upon a sheet-metal boiler heated by a petroleum flame, made self-adjusting by automatic devices controlled by the speed of the balance-wheel. Such a motor would have but a slight first cost, its cylinder would melt before a heat or pressure approaching danger was reached, and the whole would be sufficiently compact to avoid any material detriment to the symmetry of the machine. We throw out the suggestion for what it is worth, believing that there is a demand for something of practical value in this line, and hoping that the matter, as one of investigation, experiment, and invention, may be taken up by those who wish "to do good and get paid for it," as well as by those more philanthropically inclined.

TIDAL MOTORS.

To utilize for mechanical purposes the resistless flow of the tides has been the thought of many an inventor; but in practice rude wheels turned at certain portions of the day by the ebb and flow have constituted the only realization of the idea. Some of the most plausible of the projects brought forward at various times are those in which the rise and fall is applied to the compression of air in a reservoir, whence it passes to a motor of any appropriate construction. Probably in practice only a moderate power can be obtained in this way without an excessive outlay; but even this will in many cases be of much convenience and value. A similar system proposes the employment of tide-wheels for the air compression, and as suggestive of further improvements we make brief mention of the most recently devised tidal motor that has come to our notice. In it a screw or wheel is so arranged as to turn with the tide, and receive motion therefrom in whatever direction the flow may be. This wheel connects by a crank-movement with the reciprocating piston of an air-condensing pump, connecting by a valved pipe with the air reservoir, placed in suitable relation with the engine to be driven, in lieu of steam, by the air under pressure. Of course the prime cost and expense of repair are with such apparatus as with ordinary water-wheels the only elements of expenditure; and wherever practicable, something of this kind would perhaps prove preferable to small steam or caloric engines, especially in localities on coasts where fuel is scarce. An analogous opening for improvement may be found in the production of means for applying the ceaseless but irregular motion of the waves to the compression of air for use in the manner just explained. But these branches of invention, although theoretically promising, have practically serious obstacles to their introduction to extended use, which undoubtedly explains why so few devices for the purpose mentioned have ever found place in the actual propulsion of machinery.

EXPERIMENTS WITH FIRE-ESCAPES.

THE necessity of fire-escapes being acknowledged, and the comparative non-utility of those in use being conceded, interest attaches to every novel project, and especially to every new experiment having reference to their improvement. The canvas chute, a not very recent device, through which the escaping occupants of a building can slide from an upper window to the ground, has had many advocates. It has the merit of affording an easy and approximately safe means of descent when not immediately contiguous to the flame, but this is about all that can be said in its favor. It is cumbrous to carry, hard to place in position when even a moderate wind is blowing, and catches fire from sparks and burning splinters. Lately, in London, an apparatus of this class, constructed with especial regard to the avoidance of these drawbacks, was tested with unsatisfactory results. The canvas was surrounded by a mica shield, and this last in its turn by wire-cloth. A fierce fire failed to injure the apparatus; but, on being allowed to fall to the ground in a manner analogous to a quite possible accident in actual use, the mica splintered to pieces, and the thing became a wreck.

Another fire-escape, comprising the combination of a chute with a system of ladders, has also been tried in London, and in this instance, it is said, has given decided proof of utility. The ladders are on the extension principle, and calculated for an aggregate height of sixty feet, with a supplemental ladder capable of adding thirteen feet to the height just mentioned. The chute is of copper wire, formed in network having meshes three-eighths of an inch across. This, of course, will not burn; the open character of the structure lessens the action of the wind upon it, and no ordinary casualty would be likely to derange it. In the tests made with it, some of those descending from upper stories came down head first, and, although a reverse position is preferable, appear to have suffered nothing from their speedy and unusual trip. The apparatus seems, from the accounts given, to possess merit, and may perhaps incite some American manufacturer to undertake the introduction of something of the kind here, where an efficient fire-escape is certainly one of the demands of the times.

ELECTRO-MAGNETISM AND TYPE-SETTING.

THERE is no end to the number of proposed type-setting machines, and we doubt not that experiments in this line will continue until some novel system of mechanism shall, especially in book-work and for weekly journals, wholly substitute the fingers of the compositor. Among the most recent of the devices for mechanically setting type is an English invention, which embraces an idea perhaps not wholly new, but still so little tested as to afford abundant opportunity for further and promising trial. In this apparatus, magnets are so arranged in relation to a system of grippers as to transfer the types to the latter in regular order, the grippers in turn carrying the types to a guide, whence they may be readily conveyed to the galley. A plan is also suggested for making the guide itself magnetic, so that it may draw the types from conducting tubes, and retain them in the requisite vertical position, and in proper reference to each other.

Of course, many modifications may be made in the mechanism by which it is proposed to apply the principle just indicated, but in all, the type must be of materials susceptible to magnetic attraction, which ordinary type metal is not. The British inventor, to obviate the apparent difficulty in the way of using type of common material, proposes to imbed a small piece of iron or steel in the base of each separate type, a method difficult to execute, and more than likely to prove only partially effective for the purpose. A better way would be to make the types by machinery from steel wire, and use volatile hydro-carbons instead of soap for cleaning them after use in printing, to avoid the corrosion to which, by the more usual manner of cleansing, steel-type would be exposed. So much has been done, on paper, to provide mechanism for handling type that probably the machine that solves the problem of mechanical type-setting will be far from new in all its parts; and, instead of straining after novelty, it would be well for those interested in the subject to seek to correlate and perfect what has hitherto been done, so as to unite the best points of the most promising projects in new combinations and arrangements of parts and processes.

MECHANICAL PUDDLING.

THE success of the Danks rotary puddler seems to be exciting much emulation, not only in the production of machinery of somewhat similar character, but in the revival of plans that in one form or another were made familiar by experiments years ago. But there seems to have been much more of utility in several plans for some

time past before the public than has hitherto been known or acknowledged at least, in this country. Of such is the mechanical puddling apparatus of Darmoy, now in operation in about forty Austrian and French furnaces, and which has the decided merit, aside from the superior performance of its work, of being applicable to furnaces of ordinary construction. In it, a "rabble," driven by steam, is placed in the hands of the puddler, and no change is made in the furnace, except in forming the sides of the bed at an angle in lieu of perpendicular. The process as conducted by this means is claimed to eliminate both sulphur and phosphorus, so that poor brands of pig produce metal approximating the quality of charcoal-iron. The following is the description given of this apparently very valuable improvement:—

"To adapt the plan to any common existing puddling furnace, a shaft conveying power from any prime mover is carried about six feet above the furnace. A belt from a pulley transmits the rotation of the shaft to another pulley or sheave below, which rests on the belt a little in front of the furnace-door. One end of the boss of the pulley is so jointed to a handle held by the puddler, that the pulley can rotate without carrying around the handle. The other end embraces the outer end of the rabble, to which it is held by a cross-pin. The belt is thus made to rotate the rabble in any required position, in a somewhat similar way to the well-known rotating hair-brush. The number of revolutions employed is from three to five hundred per minute for white pig iron, and from eight hundred to one thousand for gray pig-iron. The belt, while carrying and rotating the rabble, endows it with mechanical energy, and allows the stirring and puddling action to be directed to any portion of the molten metal.

"The rapidity with which the tool can be worked round gives the metal such an impulse that it turns horizontally on the bed, continually renewing the surfaces in contact with the atmosphere.

"The point of the rotating rabble, instead of being hooked, carries a disk. When the iron has come to nature, this is replaced by a rabble having a short twisted point."

The Insulation of Submarine Telegraph Conductors.

IMPROVEMENTS in the means of insulating telegraph wires for submarine or subterranean lines is a subject which at times has been taken up energetically by numerous inventors, and has then been allowed to slumber for years. There have been a host of patents taken out for improvements or novelties in insulation of wires. Some have never got beyond the patent office. Other processes have got as far as the production of hand-made specimens; others have got to the stage of the manufacture of a mile or two for the purpose of experimental testing by government or some telegraph company; a few have reached the stage of larger orders, and of these only one or two have survived to anything like commercial success.

The difficulty of introducing a new invention is always great. This arises partly from the distrust caused by the host of patents taken out for inventions which have proved failures as regards either merit or novelty, and which have thus caused promoters who have embarked money in them to repent of their enterprise and use more caution in future, and partly from the opposition of those whose interest is vested in factories or machinery which would be rendered valueless by the introduction and success of any material which should supersede their own manufacture.

The man who attempts to introduce a new process or invention, whether it be his own invention or not, has a hard task before him. Even if he has some money and position, he will find it a slow process to get his invention fairly tried. He must coax and persuade officials and scientific men to take sufficient interest in his case to go out of their way to examine or inquire into its merits. He must be ready by argument to meet all degrees of objections and criticism, and to receive all manner of suggestions patiently and in good part, even if he disagrees with them. He must prepare and read papers at institutions and associations, setting forth the merits of his invention, and turn to account every word let fall by an authority by reproducing it in quotation on every suitable occasion. He must never consider anybody, however humble his position, as not worth the trouble of conversion, for he never can tell to what extent higher authorities depend on the opinions of others, or what value may be set on the opinion of any particular individual. Sometimes men of position may, after seeking the opinion of those who have the reputation before the public of being the highest authority on the subject, be finally guided in the most determined way by a word let fall in conversation by some comparatively obscure individual. He must be also constantly on the alert to answer any attack made on his case by those who have possession of the field, and he must fight, in fact, against the indifference, prejudice, or conservatism of officials on the one hand, and against the open opposition of vested interests on the other, and, finally, he must take quietly rebuffs and disappointments without relaxing his efforts or losing his courage. It requires, in fact, undaunted perseverance, an excellent temper, and a good digestion to attempt to introduce an invention, even if a man has some means at his disposal; but without such means—and how many inventors have been thus situated—it requires even more than all this to introduce a novelty, even though it may have the highest merit.

Considering, therefore, these difficulties which beset the introduction of anything new under even advantageous circumstances, it is not astonishing that numerous inventors should have advocated for years the claims and merits of their new compounds or processes for insulating wires without success, and it does not at all follow that, because they have succumbed to the ordeal they have had to undergo, that amongst these there may not be some that will crop up again, and be successful under some more favorable circumstances.

The difficulties which we have shadowed forth as those which an inventor, as a rule, has to contend with are perhaps greater in regard to the introduction of an insulating material for submarine wires than with any other invention; for even in the best of times, when there existed the competition of several telegraph companies, the question of whether a new material should be tried or not vested with a very few people. Still, when there existed independent companies, the directors and engineers had opportunities of trying new materials, and now and then availed themselves of them, and thus lengths of wire differently insulated were occasionally adopted.

If, however, it has always been difficult to get a trial of any new material for insulation in submarine telegraphy, it is still more difficult now. Submarine telegraph companies are now, and have been for many years past, got up exclusively by the large contracting companies. The contract for the cable is signed before the company comes before the public, and, in fact, the directors that are invited to join the board, and the engineers that are appointed, even if they had the greatest desire to try any new material, have not the smallest opportunity of doing so. The engineer, when he accepts his appointment, accepts his insulating material. Thus, a telegraph company emanating from the Telegraph Construction Company means gutta-percha; one from Hooper's company, india-rubber. It is true the India-rubber, Gutta-percha, and Telegraph Works Company could supply gutta-percha or india-rubber; but, if they were promoting a new telegraph company, it would be one of these materials that would have to be chosen, and the engineer of a telegraph company so promoted would be bound to one of these materials, so that, if a third material or compound appeared in the field, it would be useless for him to suggest to his directors even experiments on the new material.

Formerly it was not so; the directors of telegraph companies such as the Electric and International Submarine Telegraph Company, and Magnetic Telegraph Company, were free to use any material their engineers recommended, and, if they did not actually adopt any other than gutta-percha on any long lengths, they at any rate at times tried short lengths of new materials. The Indian Government have thus also been free to employ any material they chose, and they were the first to give Hooper's a trial on the Ceylon, and afterwards on the second Persian Gulf cable, which was followed up by the various lines promoted by the Northern Telegraph Company, and thus at last this material, whatever its merits and ultimate fate may be, has found a fair trial. It seems indeed as if there is little hope that any new material can find a trial except through Government, because any concession for a new line to be laid by private enterprise is eagerly bid and contested for by the contracting firms, and according to the possessor the material for insulation is determined before the work passes to that stage when the engineer appears. In fact, however high the names of the engineers may stand appended to a submarine telegraph company, they only become a guarantee that the material to be employed is practicable, but not at all that it is the best or cheapest or the most applicable for the particular climate in which it is to be employed.

There has been, as we have said, a vast number of patents taken out for improvements in insulating material, and although only a few of these have been tried, and fewer still have had any success, yet there has been a great advance in the insulation of wires since the first one was insulated for the experimental cable across the Channel in 1850. The gutta-percha on that wire was applied by grooved rollers, and only one coating was used. After this it was applied by means of dies, and then came the improvement of using two coatings, so that the slight air-holes which occur should break joint. The better cleansing of the gutta-percha by forcing it through wire gauze by hydraulic presses was also adopted. Then came, in 1858, the application to the wire, and between the coatings, of a compound of Stockholm tar, resin, and gutta-percha, known as Chatterton's compound. The application only is patented by Chatterton, and the compound is patented by Willoughby Smith. Compounds of gutta-percha, resin, and a suitable solvent are patented by Hancock, and in 1848, gutta-percha dissolved in tar, or

other solvent, and resin, is patented by Bedson in 1857. Since this time gutta-percha has been improved by Mr. Willoughby Smith, so as to give a smaller inductive capacity.

In india-rubber the earliest specimens that we know of consisted of rubber lapped round the wire, the lappings being stuck together by solvents. This is first mentioned in Poole's patent of 1852. The application of vulcanized rubber for insulating wire was first patented by Goodyear in 1852. Then West patented, in 1858, the process of making the lappings of pure rubber adhere by simply plunging the coated wire into boiling brine. Some miles of this wire were afterwards made at Silvertown, and H. Silver took a patent in 1859 for putting on india-rubber combined with sulphur over the pure rubber to be vulcanized by means of a bath of melted sulphur. The wire of pure rubber, unvulcanized, was tried a good deal, but it did not succeed, although it was perhaps the perseverance of C. West that first got rubber a trial at all. We do not think any of the wire covered with vulcanized rubber outside the pure rubber ever had much trial, for we can see no reason why it should not have answered.

The difficulties of insulating with rubber were that the pure rubber changes slowly into a sticky semi-liquid resembling coal-tar, the action going on from the inside outwards. This is partly said to be due to the action of the copper, for tinning the copper seems to lessen it. Vulcanization stops this altogether, but the sulphur acts on the copper, producing sulphuret of copper.

When the pure rubber is used next to the wire, and vulcanized rubber outside, the sulphur still penetrates the pure rubber, vulcanizing it slightly, and attacks the copper; but, if this is tinned, then this action is stopped, or at most reduced to a very small action on the tin. Hooper, in 1859, patented the application of tinfoil between the pure rubber and vulcanized wire, and afterwards employed oxyd of zinc and rubber as a separator between the pure rubber and the vulcanized rubber, to modify the penetration of the sulphur to the wire. The material thus produced gave a high resistance—about twenty times that of gutta-percha of the date of 1864, and a smaller electro-static capacity than gutta-percha by about 25 per cent. Since then the resistance of gutta-percha has been, however, nearly doubled, both by the Telegraph Construction Company and the India-rubber, Gutta-percha, and Telegraph Works Company.

Wray's compound, patented in 1858, of india-rubber, powdered flint, and shellac, gave very good results at the experiments in 1860, standing heat wonderfully well, but it does not seem to have been pushed.

A compound, patented by Macintosh, of paraffine and india-rubber never received much attention, and we do not know what its merits were. There have been, besides, innumerable compounds of rubber and solvents, shellac, tar, bitumen, etc., suggested and patented.

Wire is now insulated at the Silvertown Works with pure rubber, lapped on in the usual way, and covered with longitudinal strips of vulcanized rubber. The sulphur and rubber compound is applied in longitudinal strips by means of a process which is said to make a better longitudinal joint. It consists in passing the wire and strips of compound, four or five at a time, through pressing rollers, which have four or five grooves for the wire and compound, and between each groove a flat surface, with a flat surface also outside each outside groove. Thus the whole of the strip is squeezed into the grooves, and therefore, besides there being no waste, the joint is said to be better. This was patented by Matthew Gray and Frederick Hawkins in 1868.

The insulation, which thus consists of pure rubber over tinned wire, and surrounded with vulcanized rubber, has a higher resistance than Hooper's. Recent tests show it to have 30 per cent. greater resistance; its electro-static capacity is, however, a little higher. This may perhaps be improved. In any case it will be a rival to Hooper's. Some 1,000 or 1,110 miles are in process of manufacture, in the form of multiple cable for torpedo purposes, ordered by the Government. We have more to say on this subject on another occasion.—*Engineering*.

Wire-making.

As the process of wire-making and wire weaving may be interesting to many of our readers, we will give a brief description of it as conducted at the East Newark (N. J.) Works.

Copper and spelter are used in proportions differing in accordance to the quality of the wire required; the copper used being the rich product of the Minnesota mines, which gives these goods their superior quality. These two metals are smelted together in proper crucibles, and then poured into long molds, producing bars five or six feet in length, called the "wire bars." These are annealed or softened, by heating them in a large furnace, and when cooled are passed through rollers, which extend them to bars like tire iron, about thirty feet in length. They are again annealed, coiled, and passed through shear rollers, which slit the bars into square strips similar to nail rod. The process of slitting is done very accurately and rapidly, at the rate of a tun in forty minutes, with little or no loss in scrap, as the bars are previously rolled to suit the shears. These square rods are then pointed at one end and passed through a "die" (or plate with a taper hole in it, large at the entrance, or back, and reduced in size as required at the face). The projecting end is repeatedly caught by the "grippers," operated by power, and drawn through the die to a sufficient length to enable it being secured to a revolving cylinder, or drum, which, being set in motion, draws the wire through the die, at the same time winding it up into a coil. This process of annealing and drawing is repeated, until the wire is reduced to the requisite size.

For the finer sizes of wire, the ordinary metals, iron and steel, will not answer the purpose of dies, and a peculiar metal, termed "German plate," is used. Mr. Staniar states that this metal was unknown in this country previous to his coming, but that it was required to be imported from England with men to manipulate it. By the use of this metal, wire is drawn to the degree of fineness and uniformity requisite for being woven into wire-cloth as used in paper-making machinery.

The wire-cloth is woven upon ponderous looms, simple in their construction, but very heavy, weighing over three tuns each, and standing in solid masonry. In these looms the cloth is woven seven feet in width, of from sixty to seventy "picks," or wires, to an inch in width, or from 5,000 to 6,000 of these fine wires in the width required. The weaving is done by hand, with a shuttle (containing a bobbin upon which the fine wire is wound), thrown in the ordinary way, but each throw with its heavy "thud," necessary to set the wire thread, would shake an ordinary loom to pieces in a short time.

The cloth is thus woven in lengths of from 25 to 40 feet as required, and the ends neatly sewed together with wire, forming an endless apron, or belt of wire cloth, used on the Fourdrinier machines for conveying the pulp from which paper is made. Upon one end of this conveyor the pulp is poured from an "agitator," or trough, the flow from which is regulated to suit the thickness or fineness of the paper required to be made. As this pulp is thus conveyed, the water sieves through the wire-cloth, and leaves the particles of pulp adhering together, and thus commencing the first formation of paper.—*Newark Manufacturer's Gazette.*

COMMUNICATIONS

TO CORRESPONDENTS.

We wish our readers to understand that, in freely publishing communications, we do not hold ourselves responsible for the opinions of our correspondents, inasmuch as we may occasionally publish views opposed to our own.

Boiler Explosions at Less than Proof Pressures.

MESSRS. EDITORS:—The letter of Mr. Woodson, published in your issue of the 10th instant, justly states the overheating of portions of heating surface uncovered by water to be one cause of explosions at pressures below proof.

Although not mentioned in my letter to him of March 11, in consequence, probably, of the fact that I am accustomed to consider it under the head of "explosions produced by low water," I have no doubt that it is not an infrequent cause of this apparently mysterious class of explosions, and not improbably quite as common a cause of disaster under our present practice of high steam pressures, as is the return of the water upon surfaces previously exposed and overheated. Indeed, in the only case of explosion which I have been called upon to investigate, where the cause seemed *unmistakably* to be low water, the explosion occurred from just this action; the crown-sheet was weakened by overheating until no longer able to sustain a pressure something above one hundred pounds to the square inch, and finally came down, and the boiler was blown out of the vessel. This boiler had been tested as required by law, but a short time previous, to a pressure one-half higher than the working pressure at which it exploded.

Explosions are, however, much less frequently caused by low water than is generally supposed. Engineers and firemen are too well impressed with the necessity of caution in that respect to allow danger to arise frequently from that cause. It may, nevertheless, be considered a well-established fact, that a boiler, well designed, well built of good material, kept under intelligent, systematic, and frequently performed inspection, and cared for by an experienced, intelligent, and careful man, will never render its proprietors liable for damages produced by its explosion, even under the present law, which has been so amended as to allow a steam boiler, of forty-two inches diameter and of iron one-quarter of an inch thick, to carry the very high pressure of one hundred and fifty pounds of steam.

When, however, the law allows a margin of strength much less than is prudent, and prescribes a defective system of inspection, and when engine-drivers and firemen are too poorly paid to

bring up the average of skill, intelligence, and trustworthiness to a proper standard among them, and, particularly, when the ability to render political services is considered an important qualification for the also underpaid position of inspector of boilers, we can hardly be surprised that we may read, in the papers issued this morning, of an explosion on the Red River which has killed sixty people, another on the North River destroying six lives, and still another fatal explosion in Massachusetts. Seventy deaths recorded in one day from three different explosions, at points hundreds of miles apart, are a sad commentary upon our laws, and upon the callousness of the public, professional as well as non-professional, in this matter.

English boiler manufacturers put into the shells of high-pressure boilers iron of nearly double the thickness prescribed by our laws.

Our own iron-bridge builders of good standing contract to give their bridges a breaking strength six times the *maximum* working load. Our law permits, in a case in which a wide margin of safety is far more necessary, in the construction of boilers for steamboats, a factor of safety very much less, and which practically is reduced in old boilers to *one and a half*, as the strength of the boiler decreases by wear and tear, and approaches the proof pressure applied by the inspector. Where no good engineer would hesitate to recommend a greater factor of safety than that considered proper in bridge building, our law makes it much less—seriously less. The board of supervising inspectors of steamboats should properly relieve us of the danger by securing proper legislation; but, although they have already done much, it seems very probable that, attacked by a powerful and interested party, and unsustained by an intelligent and active public sentiment, the good may be undone and further improvement put quite out of the question.

I think, with Mr. Woodson, as does, I presume, every experienced engineer, that it is very important that every boiler should be so designed as to secure a good circulation of water throughout. I have in preparation, by request of the Treasury Department, a paper upon the subject of steam-boiler legislation and management which will, should I be able to find time to make it so, be quite exhaustive, and will, I presume, be published. I hope that your correspondent will find it of interest. Respectfully yours,

R. H. THURSTON.

STEVENS INSTITUTE OF TECHNOLOGY, HOBOKEN, N. J., April 12, 1872.

MESSRS. EDITORS:—The notice you made in the AMERICAN ARTISAN a few weeks since, that I desired manufacturers and inventors to mail me their circulars, catalogues, price-lists, etc., has brought to my table a mass of such printed matter from all parts of the United States, as well as from several points in Europe; the result demonstrating the fact that the AMERICAN ARTISAN is attentively read, and its suggestions judged worthy of consideration. These catalogues, etc., will enable me to reply to numerous inquiries as to the place of manufacture of many articles I have hitherto been unable to locate.

Very truly yours, WM. FOSTER DODGE.

OFFICE OF THE MANUFACTURERS' GAZETTE, NEWARK, N. J., April 11, 1872.

THE oft-stricken city of Antioch, in Syria, has again been partially destroyed by an earthquake. One thousand five hundred inhabitants lost their lives, and the survivors are in great distress.

New Mode of making Sheet-iron.

DURING the past two or three years, several processes have been devised in this country for the manufacture of so-called Russia sheet-iron. Among the very latest of these is that patented by William Rogers, of Apollo, Pa., a sketch of which we give below, as of interest in connection with what appears to be a growing, although new, industry among us.

The inventor takes a good article of wrought-iron, and, by means of suitable rolls, rolls it into sheets of a "gauge" twenty-two to twenty-four. It is then coated or otherwise covered on the surface of each sheet with particles of charcoal of about the size of a grain of wheat, taking care to have these particles evenly spread over the entire sheet, completely covering the surface with them. There is then laid another sheet of iron upon this first sheet, and, in like manner, its upper surface covered with like particles of charcoal. The operator thus continues to place sheet upon sheet, covering the upper surface of each until is formed a pack of about forty sheets. The edges are then clamped in the usual manner for forming packs of sheet-iron, and the pack then placed in the heating furnace, with the under sheet of the pack resting upon a bottom plate. There is then placed around the edges of the pack wood which has been thoroughly soaked and saturated with water, forming a protecting wall of wood. The mouth of the furnace is then closed so as to prevent the admission of air into it. The fire is then started in the fire-chamber, using wood as the fuel. After the fire has become completely ignited, the damper is lowered so as to retain the heat, smoke, and gases of the fire in the furnace. After the iron has been subjected to the action of the heat, smoke, and gases of the furnace until each sheet in the pack has become red, which will require about two hours, the pack is removed from the furnace and subjected to the action of a "steam-hammer," or other concussive or impinging force, for the purpose of working the oxyd which has been formed on the surfaces of the sheets into the body of each sheet. The pack is then unpacked and repacked in the same manner as in forming the first pack, taking care to bring the center sheets of the pack to the outside of the pack, and the outside sheets to the inside, thus interchanging consecutively the center sheets. The pack is again subjected to heat in the heating furnace in the same manner as in the first pack. It is then removed from the furnace, and again subjected to a hammering or other force, as in the first instance. This packing, heating, and hammering process is repeated four or five times, which will, as a general rule, sufficiently work into the iron the oxyd formed on the surfaces of the sheets at each heating of the pack, and give it the necessary finish and polish. The sheets are then trimmed by the shearing process, and passed through the annealing oven one sheet after the other. The passing of the sheets through the length of the oven will be sufficient to anneal and properly color them. The sheets are now finished and are in a merchantable condition.

The inventor has found that, by submitting sheet-iron to the process hereinbefore described, its body becomes tough and pliable, and that its surfaces are provided with an oxydized coating which is also tough and pliable and not liable to crack or scale off, and that the sheets are provided with a smooth and polished surface which is not liable to rust.

It has also been found by experiments that iron scales and other metallic oxyds may be combined with the charcoal in covering the surfaces of the sheets, in forming the pack for the furnace, and that such combination answers as a good substitute for the charcoal alone. But it will be found that the use of charcoal without combining it with other matter will be sufficient to produce the desired result when it is used in the manner hereinbefore described.

It is also found that the edges of the pack may be protected by the use of clay or other earthy and mineral matter, moistened with water so as to make it adhesive, and they answer as a substitute, in many respects, for the wood protection hereinbefore described. But experience shows that wood soaked and thoroughly saturated in water is the best protection for the edges of the pack.

The inventor states that he wishes it clearly understood that he is aware that charcoal has been placed between the sheets of a pack of sheet-iron prior to subjecting it to a hammering or rolling process. Also, that sheet-iron, after having its surfaces cleaned or scoured so as to remove the scales or oxyd from it, has been heated so as to form a delicate surface of oxyd on the sheet-iron after such cleaning, and then subjected to a rolling or hammering process. But he does not claim these latter processes as forming any part of the invention or process.

NEW AMERICAN PATENTS.

WE give, as follows, notices of some of the most interesting inventions for which Letters-Patent of the United States have recently been issued:—

ROTARY ENGINE.—J. J. Clark and B. Clark, Elgin, Ill.—*April* 9.—The most distinguished feature of this improvement is found in the use of an elliptical ring provided with steam-ports, and arranged within the cylinder of a rotary steam-engine, so as to be held outward against the inner circumference of the cylinder at opposite points, and inward against the rotary piston-head at opposite points. Among additional features is the elliptical ring having steam-ports, as combined with sliding pistons in a rotary piston-head.

DISTRIBUTING ELECTRICITY FOR GAS-LIGHTING AND FOR OTHER PURPOSES.—S. Gardiner, Jun., New York City.—*April* 9.—This inventor claims the manner of supplying to a city electricity conducted through main wires, having laterals running into dwellings and other requisite places. Also, the use of registers, suitably constructed and arranged. Also, a general local battery for supplying electricity through main and lateral wires as specified.

GRINDING MILL.—J. G. Lane and W. J. Lane, Millbrook, N. Y.—*April* 9.—The gist of this invention is found in the combination with mill-plates, with concentric rings of teeth fitted to rotate between each other, of tangential or radial grooves made shallower as they approach the periphery of the plates.

CONSTRUCTION OF OVENS FOR BAKERS.—H. Chatain, Washington, D. C.—*April* 9.—This is a removable oven, constructed of rabbeted bricks held in position by iron frames, and connected together by bolts. There is also claimed the combination of an iron foundation and upper frame of suitable construction with interposed bricks, rabbeted at their edges, so as to form a light and strong oven.

SPLICE-PIECE FOR RAILWAY RAILS.—R. French, Seymour, Conn.—*April* 9.—This device is made of two pieces welded together at the base of the rib, and having a slot or unjointed portion underneath the seat of the rail. The inventor also claims in connection with a bar rolled out in appropriate shape, and from which pieces to form the splice are cut, a swell or enlargement to form a welding surface, as well as a gauge to the extent of the welded surface.

MACHINE FOR MAKING RUBBER HOSE.—J. Murphy, New York City.—*April* 9.—This machine is so constructed as to revolve a mandrel between a sliding table and two lines of rollers. It also includes a mechanism for transmitting a positive revolving motion to the lines of rollers from the

sliding motion of the table, consisting of a rack gear-wheel, and a swivel, or their equivalents. Also, a system of rollers capable of being raised and lowered, and having a positive revolving motion transmitted to them by the sliding-table.

GAS APPARATUS.—J. H. Steiner, Cincinnati, Ohio.—*April* 9.—Among the more notable peculiarities of this apparatus is a reservoir for containing dilute acid, arranged in such relation with a retort or series of retorts which contain metallic turnings as to supply the dilute acid automatically to one or more of the retorts as required. Also, the arrangement of the reservoir and retorts in such wise that the weakened or waste acid and water can, after use, be returned to the reservoir or discharged from the apparatus automatically. Also, the arrangement of the carbureter within the reservoir.

HARVESTER.—C. B. Wolgemuth, Mount Joy, Pa.—*April* 9.—This invention is characterized by the combination of a reaper platform, its drag, and rear supporting-bars, and their connections with the same rock-shaft and a single lever, the whole arranged for supporting and raising or lowering the inner end of the platform.

METHOD OF DRESSING FLOUR.—B. Barter, Faribault, Minn.—*April* 9.—Aside from certain minor features, the most prominent in this improvement is the method of dressing flour by means of an upper shaker, provided with cloth of different fineness, arranged transversely for grading and bolting, and a lower shaker, divided into longitudinal sections, with cloth of the same fineness in each section, but differing in fineness from each other, for receiving the different grades of flour, in connection with a fan or its equivalent for producing an air current.

COMPRESSION VALVE.—E. Bourne, Pittsburg, Pa.—*April* 9.—This invention comprises facing, inclosing, or otherwise protecting the elastic pad, packing material, or substance interposed between a compression valve and its seat, by means of a thin flexible metallic plate, box, covering, or envelope.

MACHINE FOR CUTTING LOAF SUGAR.—P. O. Brunjes, New York City.—*April* 9.—This improvement embraces a novel arrangement of two followers moving on a common platform at right angles toward each other, one advancing while the other retreats, and *vice versa*, in combination with two sets of saws acting in conjunction with said follower.

MACHINE FOR CALENDERING PAPER.—T. B. De Forest, Birmingham, Conn.—*April* 9.—This is a calender for paper in which one or more of the rolls are constructed and provided with mechanism to impart to the said one or more rolls a longitudinal and reciprocating movement combined with a revolving movement of said rolls.

ARTIFICIAL STONE.—G. L. Eagan, San Francisco, Cal.—*April* 9.—This process of making artificial stone comprises, first, the preparation of a material composed of lime or cement and sand, moistened with a previously prepared bituminous or asphaltic solution; secondly, the molding of the material thus prepared and moistened; thirdly, the drying of the same; and, fourthly, the complete saturation of the stone thus prepared with silicates after it has been thus molded and dried.

CAR-COUPLING.—P. G. Gardiner, New York City.—*April* 9.—This improved car-coupling is constituted by a compressing or reacting spring, constructed and arranged in or upon the throat or base of the jaw or of the coupling or buffer-hook, suitably constructed and arranged so as to be self-coupling, and to maintain a constant elastic pressure between the connecting parts of the coupling and buffer-hooks when the cars are coupled.

SUPPLYING STEAM TO TRAVELING ENGINES.—E. Lamm, New Orleans, La.—*April* 9.—The novelty of this invention consists in the employment, as a motive-power in propelling cars, of highly heated water from which steam is carried off and worked, said highly heated water being contained in a reservoir disconnected from the boiler where it is heated and carried on or by the cars in the propulsion of which it is to be used.

PRINTING TELEGRAPH.—G. Little, Rutherford Park, N. J.—*April* 9.—Of the more essential features of this invention may be noted the use of an iron type-wheel, polarized by an induction coil, in combination with a magnet to effect the impression when the polarity of the type-wheel is changed by reversing the electrical current. Also, the arrangement of the type-wheel upon an arbor running through a coil, and provided with a swinging clamp or feed to move the type-wheel, in combination with an electro-magnet that operates the said means of moving the type-wheel.

VULCANIZED RUBBER TUBING.—T. J. Mayall, Boston, Mass.—*April* 9.—This new article of manufacture consists in an india-rubber hose or tubing, made with fluting or other ornamental configuration in relief upon its exterior.

DOOR-CATCH FOR RAILROAD-CARS.—Charles Graham, Kingston, Pa.—*April* 16.—This invention consists in the combination of a hook-ended lever-like catch, pivoted within a shell which is to be secured to the floor of the car, and is actuated by a spring, with a roller supported in a suitable bearing-piece which is to be secured to the lower part of the door, whereby a very cheap and effective catch is produced which is automatic in its operation.

MACHINE FOR TRANSMITTING MOTION IN VARIOUS DIRECTIONS.—Charles P. Grout, New York City.—*April* 16.—This invention consists, firstly, in the novel construction and arrangement for transmitting power of a friction-wheel, so arranged in contact with a driving-wheel having a rim of circular form in its transverse section that it is capable of swinging over said rim either in a direction parallel with the planes of rotation of said driving-wheel or transversely thereto, and still remain in contact with said rim, so that it may always have rotary motion transmitted to it; such swinging movement of the said friction-wheel permitting it to transmit motion by suitable gearing to a shaft which is capable of swinging in various directions relatively to the shaft of the driving-wheel. The invention also consists in certain novel arrangements of shafting, gearing, and connections whereby rotary motion may be transmitted through shafts, while the angles at which such shafts are placed to each other may be varied at pleasure.

New British War Vessel.

THE *Thunderer*, a British war vessel just launched, is a monitor based upon the American models, but with variations introduced with a view of removing the more objectionable features of the monitor system. Thus, instead of having as low a freeboard as possible, a height of four feet six inches has been allotted to the hull above the water-line; the turrets, instead of being exposed, are protected by a powerful breastwork; and, instead of being constructed upon as small a scale as possible, she has been built on a scale sufficient to enable her to carry the unprecedented armament of four 35-tun guns, with the capacity of storing during a voyage the extraordinary supply of 1,750 tuns of coal. With such capabilities as these, she has a burden of 4,500 tuns, a length of 285 feet, and an extreme breadth of 62½ feet; and, large as these proportions are, one of the few defects the Committee of Ships' Designs find in her is that she is not large enough, and that in future such vessels should be built upon a larger scale than either the *Thunderer* or the *Devastation*.

Rock-boring Machine.

A GERMAN machine for rock-boring, worked by compressed air and tested by several years of practical working, is thus described:—

"The machine is constructed as light as possible, and weighs only 95 lbs., the cylinder and slide-valve being made of brass, all other parts of cast steel. It works with a pressure of 1¼ to 1½ atmospheres, and makes from 350 to 400 blows a minute. At the mine Altenberg, a level was formerly driven in quartzy dolomite, with many cavities, by two men who changed every eight hours, and who could not advance more than three meters per month, at a cost of 194·88 francs per meter, while two men and a boy, changing twice a day after a ten hours' shift, can drive, by the help of the boring machine, seven meters a month, at a cost of 80 francs per meter. The cost for compressing the air necessary for two machines by a 6 horse-power steam-engine was per current meter, for coals, 26·78 francs; oil, 0·42 franc; wages, 8·65 francs; and these amounts, added to the expenses for the work in the mine, leave a saving of 38·37 francs per current meter."

The Brooklyn Park.

WORK is progressing in the Prospect Park, Brooklyn, N. Y. Already eight miles of walks are completed, and from twelve to fourteen miles of drain and water-pipes have been laid, and a new bridge of *béton coignet* is nearly completed. The large lake, containing some fifty-four acres, and which was barely completed at the close of the last season, is now being filled with water, for which purpose the pump in the large well is at work constantly, pumping at the rate of 700,000 gallons in twenty-four hours. The quantity of water which will be daily required during warm weather to keep a pond of this size at a uniform level to offset evaporation alone will be something like 400,000 gallons. In addition to this amount, which will be substantially a constant quantity during the months of May (in part), June, July, August, and September, the puddling of the lake, from the nature of the material, is not entirely impermeable, and the consequent infiltration will require a considerable additional supply to make good this deficiency, which will, of course, decrease as the bottom "tightens."

The operations of this great well at the Park are not uninteresting. A constant flow of water is being pumped through the Park water-courses into the lake, and is the water from the drainage of the southern slope of this locality, intercepted at a level of thirteen and a half feet (mean high tide being the datum plan) on its way to the sea. This well substantially supplies all the water required on the Park for useful and ornamental purposes.—*Brooklyn Eagle.*

French Floating Steam Fire-engines.

ACCORDING to *Engineering*, the French Government have ordered from England three steam floating fire-engines of quick speed and light draught for the port of Marseilles, and a trial was lately made with the first one of these three on the Thames. The float measures 45 feet in length, 4 feet 6 inches in depth, and has 8 feet beam. She draws 2 feet of water forward and 2 feet 10 inches aft, and is fitted with twin screws, driven by a pair of inverted cylinder engines acting independently. Steam is supplied to the propelling as well as to the pumping engines by a Field boiler. The pumps have a combined power of about 1,000 gallons per minute, a very large delivery for a float of such small size.

A FEW days ago there arrived in New York City, by way of the Union Pacific Railroad, a car-load of fresh roll butter weighing 20,328 pounds, most of it done up in a neat, compact form, enveloped in snow-white linen, and packed in brine in iron-bound tierces. The butter has been on the road twenty-three days, and has the rich yellow appearance and delicate flavor of our June dairy. This is the first consignment of butter ever received in New York from the Pacific States, and will have a decided result on the market, as it is not two years ago that we sent more than double this quantity to California.

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OF THE

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VOL. XIV. NEW SERIES. 1872.

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The principal Office of Messrs. Brown, Coombs & Co. is at 189 Broadway, New York, opposite John Street, where all Inventors—whether resident or temporarily sojourning in the city—are invited to visit them. In most instances, no model or drawing of an Invention will be necessary on the first interview, as a mere *oral* description by the visitor will ordinarily suffice to convey such a knowledge of his invention as will enable Messrs. Brown, Coombs & Co. to definitely determine whether a machine or process is new or old—patentable or not.

Messrs. Brown, Coombs & Co. are prepared to furnish to persons residing at a distance from New York—free of charge—*written opinions* as to whether Inventions contain any features of patentable novelty; to do this they simply require a sketch or rough model of the Machine or other Invention that is supposed to be new, together with a brief description of the same; and as soon as possible thereafter a letter of the best advice is mailed to the person desiring the information. These opinions are formed from their own mature experience, and may generally be relied upon. In some few instances, however, it may be desirable to have a *preliminary examination* made in the United States Patent Office in Washington, in which city Messrs. Brown, Coombs & Co. have a *Branch Office* for the transaction of such business as can only be satisfactorily performed in that city. For this extra service the small fee of $5 is payable in advance.

EXPENSES OF OBTAINING PATENTS FOR INVENTIONS AND DESIGNS UNDER THE

NEW PATENT LAW.

In making application under the new law of 1870 for a United States Patent for an Invention, the first instalment of the Government fee is $15, which sum—together with fifty cents revenue stamp-tax on the power-of-attorney—*is payable in advance* on applying for the Patent, and $20 additional are due to the Government when the Letters-Patent are allowed. The agency fee charged by Messrs. Brown, Coombs & Co. is from $25 upward, according to the labor involved, but in all cases their charges will be as moderate as possible for the preparation of drawings and all necessary documents. This fee is not payable until after the application has been prepared and the case is ready to be sent to Washington, and it includes all necessary services performed by Messrs. Brown, Coombs & Co. through their *Branch Office* in Washington, to secure the speedy and certain issue of the Patent.

Patents for Designs can be obtained at a less cost than Patents for Inventions, but these Patents only cover novelty of shape or configuration. They can be obtained for three and a half, seven, or fourteen years. The Government fees are payable in one sum in advance, and are $10 for three and a half years, $15 for seven years, and $30 for fourteen years. Messrs. Brown, Coombs & Co.'s agency charges on Design Patents vary from $15 to $25. The Patent Office does not require models for Design Patents.

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Before an Inventor has completed his machine or improvement, he can cause a description of it—accompanied by a drawing, if necessary, and illustrating his invention so far as it is perfected—to be made and deposited in the "secret archives" of the Patent Office as a "caveat," which entitles him to receive notice, during the next year, of any application for patent made by another person on a similar invention, and gives him the opportunity to contest priority of invention with such other person. The Government fee on a caveat, under the new law, is $10, and Messrs. Brown, Coombs & Co.'s charge for preparing all necessary papers is from $10 to $15. Caveats can only be filed by citizens of the United States, or foreigners who have resided in this country for one year and made oath of their intention to become citizens.

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Messrs. Brown, Coombs & Co. also give special attention to the prosecution of applications for Patents which have been *rejected* in the hands of other attorneys; also, to the *extension of expiring Letters-Patent*, and to the *re-issue of defective Letters-Patent*, in all of which branches of business they have been eminently successful. They also give opinions on the *infringement* of Patents.

MODELS, SPECIMENS, ETC.

No models are required for design-patents, and in other cases it is left to the discretion of the Commissioner of Patents whether he will require a model; but in order to enable the model to be dispensed with, the drawings require to be very full and plain, and the specification to be prepared with great care and skill, and it will be more than ever necessary that the inventor should employ a thoroughly competent attorney. Messrs. Brown, Coombs & Co. will, whenever desired, and if it is possible to do so, obtain the permission of the Commissioner of Patents to dispense with a model. This, in many cases, will save the inventor much trouble and expense in obtaining the patent; but we recommend, as a general rule, that a model should accompany the application. Models, when required, must be neatly and substantially made of hard wood or metal—or if of soft wood must be painted or varnished; they should not exceed one foot in any of their dimensions.

Applications for Patents on Compositions of Matter require to be accompanied by specimens of the ingredients and of the composition.

To enable Messrs. Brown, Coombs & Co. to properly proceed with any application, the models—when required—or specimens should be placed in their hands along with the Government fee, or the first installment thereof, at the first stage of the application. The models or samples may be forwarded to Messrs. Brown, Coombs & Co. by express, carefully boxed, and money may be sent by express, by check or draft, or by post-office money order.

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TRADE-MARKS.

One of the provisions of the new law is that for the protection of Trade-marks by registration in the United States Patent Office. Heretofore, Trade-marks—except so far as particular designs could be patented—were only protected in a loose and uncertain manner by the State courts; but now the United States offers definite and certain protection for the term of thirty years, at a fee of $25. Messrs. Brown, Coombs & Co. obtain these protections upon the most reasonable terms, according to the nature of the case.

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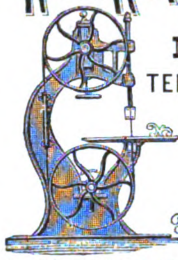

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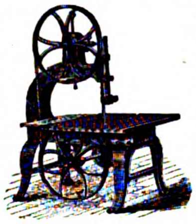

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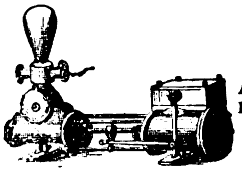

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None but ORIGINAL illustrations—preferably executed by *our own engravers*—will be published in the AMERICAN ARTISAN. Distant patentees desiring to have their inventions illustrated and described in our columns, should at once send us a small model of their machine, by express (prepaid); or mail a good photograph, together with their LETTERS-PATENT, to our address. We will then promptly examine the same, and return a reply, stating the precise expense of the engraving, the payment of which will be always required in *advance*. Address models, documents, etc., for the above object, as follows:—

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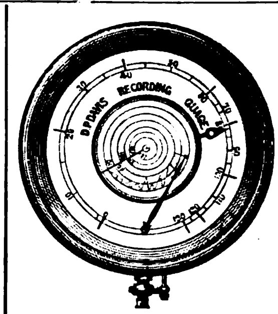

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VOLUME XIV. New Series. | NUMBER 18. | NEW YORK, MAY 1, 1872. | $2 00 PER ANNUM IN ADVANCE. SINGLE COPIES, FIVE CENTS.

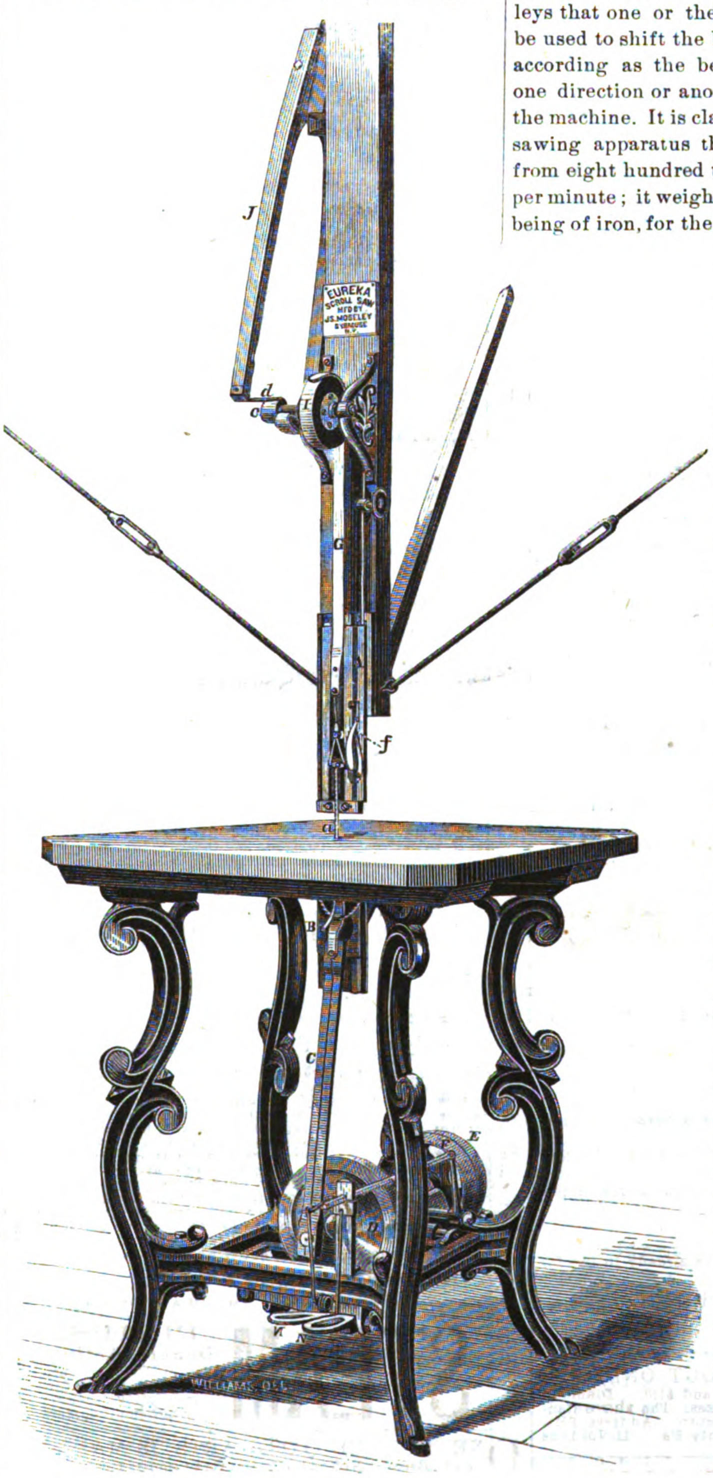
CONTENTS OF THIS NUMBER

[Illustrations are indicated by an asterisk.]

*Moseley's Patent Eureka Scroll-saw.

OUR engraving represents the "Eureka" scroll sawing machine, patented April 25, 1871, by Mr. Jerome Moseley, and manufactured by him at Syracuse, N. Y. Concerning this machine, the judges at the late fair of the American Institute reported as follows:—It is "admirably adapted for all kinds of scroll-sawing, from the coarsest to the finest. It is very convenient in operation and does excellent work; is easily adjusted and simple in construction. As the saw requires no pins, pieces of the longer saws can be used successfully." The apparatus also received the first prize medal at the New York State Fair, in 1870, and also at the International Exposition at Buffalo, in 1871. We append a brief description of its construction and operation.

The saw, *a*, passes through the table in the usual manner, and has its upper end attached to a suitable slide working in the adjustable guide, A, and its lower end attached to the sliding cross-head, B, fitted to guides underneath the table. The vertical movement of the cross-head, and consequently of the saw, is received from the pitman, C, from the crank on the wheel, D, the shaft of which also carries the fast and loose pulleys, E. F. To the slide at the upper extremity of the saw is connected a strap, G, attached at its upper end to a wheel, I, on one extremity of the shaft of which is a cam, *c*. From a point on the periphery of this cam extends a strap, *d*, to the free extremity of a vertically arranged wooden spring, J, the elastic action of which tends to rotate the shaft of the cam and wheel, in such wise as to exert a tension on the strap, G, thereby straining the saw. The wheel, I, is made adjustable upon its shaft by simple devices, so that the strap, G, may be adjusted either to different lengths of saw, or to exert any required tension or strain upon the same. The adjuncts of the upper slide and the cross-head below, by which the saw is held, are so contrived that the ends of the saw are gripped between clamping surfaces without the aid of pins, and devices actuated by a short lever, *f*, are so arranged that, when required in the exigencies of the work in hand, the upper end of the saw may be quickly and conveniently released from its fastenings. Suitable means are also provided for readily raising the guide, C, out of the way under like conditions when it is required, in changing the head of the saw to another part of the work, to lift the latter over the saw. At the base of the machine, and in convenient proximity to the foot of the operator, are pedals, N, so connected by appropriate mechanism with the fast and loose pulleys that one or the other of the said pedals may be used to shift the belt and to actuate the brake, according as the belt may be arranged to run in one direction or another in stopping and starting the machine. It is claimed for this improved scroll-sawing apparatus that it can be run at a speed of from eight hundred to twelve hundred revolutions per minute; it weighs about 380 pounds—the frame being of iron, for the purpose of securing stability; and that it will saw the lightest veneered work, such as piano and melodeon work, music-racks, and fret-work as well as the heaviest car pentry and wagon-work, and it is capable of running saws from one-sixteenth of an inch wide to any width that can be practically used in a scroll saw machine. For certificates of the favor with which this apparatus has been received in manufacturing establishments, our readers will see advertisement in another column.



MOSELEY'S PATENT EUREKA SCROLL-SAW.

Academy of Sciences.

THE National Academy of Sciences met in Washington a few days since, and elected twenty-five new members, which increases the membership to seventy-five. By the Act of Congress under which the Academy was originally organized, the membership was limited to fifty. Afterward it appeared that there were more than that number of men in the country whose union with the Academy was desirable, and there were other inconveniences caused by the restriction of numbers. Last session a bill was introduced by Senator Wilson allowing the society to determine the number of its members. The twenty-five were chosen under this new law, and still others will probably be elected when there is a meeting at which the new members can act with the old in electing their associates. The annual meeting will be held hereafter on the third Tuesday of April. The president is Prof. Joseph Henry, of the Smithsonian, and vicepresident, Prof. Wolcott Gibbs, of Harvard.

The New Steamship Adriatic.

THE new steamship *Adriatic*, the fifth of the White Star line of Liverpool and New York ocean steamers, arrived at the latter port from Queenstown at an early hour on the morning of April 21, after a passage of about eight days and a half. This vessel, in external appearance, resembles her predecessors, having the same beauty of outline in molding, but is much larger than the others, her net British measurement being over two thousand nine hundred and fifty tuns. The dimensions of the *Adriatic* are:—Length over all, 450 feet; breadth of beam, 41 feet; depth of hold, 32 feet. The engines are of the compound principle, and were constructed by Messrs. Maudslay Sons & Field, of London.

A Curious Trophy.

THE Smithsonian Institute has just received a curiosity of great novelty and value for the national museum. It is a battle trophy of a race of natives living near the head-waters of the Amazon River, and is the head of a captive condensed by some unknown process to a size not more than three inches in diameter, the original proportions of the features being preserved. It looks like the head of some pigmy. These trophies are esteemed highly by the natives, and they are difficult to obtain. Only one other is known to have been brought to this country. This one was a present to the Institute by Raymond de Feiger, of Ecuador, through E. Rumsey Wing, our Minister at Quito.

THE PRESERVATION OF TIMBER.*

BY RICHARD H. BUELL, C.E.

THE durability of timber is chiefly affected by *wet-rot*, *dry-rot*, and the attacks of insects. Wet-rot commences externally, and is caused by changes of temperature, and alternate exposure in wet and dry situations. That portion of a pile that is between high and low water mark is liable to be affected by wet-rot. A water-proof coating would be a sufficient protection against this form of decay.

The subject of dry-rot has received a great deal of attention during the present century, and one ancient writer, Pliny, speaks of it. Pliny's treatise on the preservation of timber shows evidence of great observation and research. In this article we are told that the decay of timber is caused by its juices; that, to render timber durable, the juices should be removed, and it is recommended that a tree should be cut to the heart all around, to let the juices escape, and that the tree should not be felled until the whole had run out. Pliny also remarked that resinous and oleaginous matter in wood preserved it, that odoriferous wood was generally durable, and that much depended on the close texture of the timber.

The dry-rot ordinarily commences in the interior of the wood, where there is not a free circulation of air, and reduces the firm mass to powder, so that, while the wood on the outside is unaltered, an examination will show that it is only a thin casing, the whole interior being destroyed. Thus we see that a waterproof coating on the outside of a piece of timber may, indeed, prevent the wet or external rot, while, by stopping the circulation within, it induces the far more rapid and destructive dry-rot in the interior.

The first description of dry-rot that is preserved was given by Thomas Wade, in 1815, as follows:—"The wood at first swells; after some time it changes its color, then emits gases, which have a musty or mouldy smell. In the more advanced stages of it, the mass cracks in transverse directions. Lastly, it becomes pulverulent, and forms vegetable earth; and generally, in some of these stages of decay, the different species of fungus are found to vegetate in the mass."

Another illustration, from Stockhardt's Chemistry, may be of interest:—"Put, during summer, some sawdust moistened with water in a close vessel, and let it stand for some months; the wood will gradually lose its firmness, and be converted into a white, friable substance. A splinter of wood will not continue to burn in the air of the vessel, since the air no longer contains free oxygen, but carbonic acid. The water, too, has disappeared; it has chemically combined with woody tissue."

The cause of dry-rot is the putrefaction or fermentation of the juices, and, as the communication between the different portions of the mass is very complete by reason of the tubes or cells, the disorder is rapidly spread throughout the whole structure. It is not certain that fungus is always present on these occasions, but it can generally be observed, and its growth is believed to be due to the presence of the minute seeds of this parasite, which may enter through small orifices while the tree is growing, and possibly may be absorbed by the sap in the leaves, but at all events can find ready admission when the tree is felled. Experiment shows that the putrid and fermenting sap affords excellent nourishment for the growth of the fungus. Whether or not the fungus is present, the action of the soluble matter in causing its decay is shown by analysis—sound wood, which contains from five to seven per cent. of soluble matter, when decayed having frequently less than one per cent., the fermenting sap having combined with the water in the wood, and formed a corrosive liquid, that destroys the solid portion of the material.

It has been mentioned that Pliny, the oldest known writer on the preservation of timber, recommends that the trees be girdled to allow the sap to run out, and that they be cut down when dead. This brings an important question before us, Which is the best season for cutting timber? Opinions seem divided on this subject, but the best authorities, in my opinion, point to spring or autumn, rather than the winter, as the proper season. Although Pliny mentions no season in his recommendation for girdling the trees, it is scarcely possible that he intended it to be done in winter, since that is the plan adopted by settlers in a new country to rot the trees and clear the land. Very few experiments are on record giving the comparative durability of timber cut at different seasons, but an article in *Silliman's Journal*, by Mr. Phinehas Rainey, furnishes some interesting information. In 1810, Mr. Rainey commenced to build a vessel, and, wishing to make it as durable as was possible with unseasoned wood, he cut the material for it in the latter part of December, the timber used being white-oak and chestnut. As the work progressed, it was found that more wood was needed, so in April, 1811, he cut three quarter-top timbers, and in May two white oak trees for the after-part of the plank sheers. The vessel was finished in July, 1811, and in the spring of 1815 she had to be built up from the middle wale on account of decay. The timber that was cut in the spring was perfectly sound, the most decisive result being shown in the after-plank sheers, which, though surrounded with rotten wood, were in excellent condition. These facts led Mr. Rainey to suppose that the theory advanced by the botanists, and generally received, that the sap resides in the roots of a tree in winter, might be erroneous, and he determined to test the matter. He cut some pieces of oak in summer, and made a fire with them, when he observed that a wet ring was formed around the exterior of the wood in the part occupied by the alburnum, and that steam issued from this, while little, if any, was seen to come from the heart-wood. A similar experiment with pieces of oak cut in December gave exactly opposite results, the wet circle being in the part occupied by the heart-wood, and no steam issuing from the alburnum. Whence Mr. Rainey concludes that the sap, instead of residing in the roots in winter, is in the heart-wood, and that the effect of cutting in the winter season is to render the most valuable portion of the timber liable to speedy decay.

Another fact tending to confirm this theory is that, if the sugar-maple tree is tapped in winter, it is necessary to bore through the alburnum into the heart-wood before the sap will rum.

Dr. Boucherie, of France, whose researches on the subject of the preservation of timber are well-known, recommends that trees be felled in summer or autumn, or, at all events, in any season but winter, for the reason that when the sap is in circulation it is more readily expelled or dried.

The English ship, *Sovereign of the Seas*, which was broken up after forty-seven years' service, and was found so hard that it was almost impossible to drive a nail into her timbers, is sometimes referred to as an illustration of the durability of winter cut wood; but the report of her builders renders it almost certain that the materials of which she was constructed were obtained in spring or summer.

We have seen that the dry-rot in timber is caused by the soluble matters which the wood contains, and that these, combining with the water, act upon the cellulose or woody fiber, and that heat and a bad circulation of the air are favorable conditions for the action. Hence an obvious means of prevention would be to remove the soluble matters and the water from the wood either by drying or otherwise. Green wood contains from thirty-eight to forty five per cent. of water. Experiments have been made which show that drying in the air will not entirely remove this water. Count Rumford found that a piece of oak, which had been drying for one hundred years, when heated lost nine per cent. of water. If wood is reduced to fine powder, and heated to 310° Fahr., all the water can be driven out, but on exposure to the air the wood will again absorb about ten per cent. of water. By the application of heat to the wood, the albumen which it contains is coagulated, and is thus rendered less liable to change. This seems to be the result of steaming timber, which has frequently been recommended; but we see that this method, although somewhat retarding the decay of the timber, can scarcely be called a perfect preservative. The principles of "seasoning" timber, or drying out the water which it contains, were very imperfectly understood in former times. It was formerly the custom, in building wooden vessels, to do so slowly, with the vessels uncovered on the stocks, so that in this manner the timber might become seasoned. As we might reasonably expect, vessels so built frequently became rotten before they were launched—the high winds, the rains, and the great changes of temperature lay-

* Paper read before the New York Society of Practical Engineering, April 18, 1872.

ing all the seeds of disease in the wood. It is found better to build a ship under cover, with provisions for a free circulation of air. A great deal of timber has also been ruined by being stacked on the ground in compact masses. A better way is to raise the logs clear of the ground, on iron or stone supports, and arrange them so that there are numerous openings for the free passage of air. A shed should also be built to protect the timber from the weather, and sudden changes of temperature must be guarded against, if possible. Timber treated in this way from two to four years, according to size and quality, has its durability considerably increased; but the method is not, from the nature of the wood, a perfect preservative.

Mr. Davison's "rapid seasoning," which was tried by the English Admiralty in 1835, is accomplished by forcing currents of heated air through cylinders containing the wood. The current of air has a velocity of one hundred feet per second, and the pipe by which it enters the cylinder is large enough to cause all the air in the vessel to be renewed in every three minutes. The temperature of the air depends upon the kind of wood:—For hard wood and thick pieces, 90° to 100° Fahr.; soft wood and thin pieces, 180° to 200°; thick pieces, 120°. The time required to complete the process is estimated as follows, supposing the action to be maintained for twelve hours out of every twenty-four:—Four-inch planks, four weeks; six-inch planks, seven weeks; eight-inch planks, ten weeks; and so on. This process must be conducted with great care, otherwise the timber will warp and crack; but with proper management the timber, though not permanently preserved, as claimed by the inventor, has its durability considerably increased. Cracks in wood should be guarded against, for it is doubtless to them that many cases of dry-rot may be traced, since air, light, and moisture seem greatly to hasten the growth of fungus. A striking instance of this was given by boring a two-inch hole in a piece of perfectly sound timber. In twenty-four hours such a growth of fungus had taken place that the mass could be drawn out like a stick.

The vegetable albumen in the wood, which is the chief cause of its decay, can be washed out by cold water, and this method of seasoning is frequently employed. It must be evident that, if we succeed, by immersing the timber in fresh water, in washing out all the albumen, we obtain, after drying the wood, a material that is imperishable under the ordinary circumstances of exposure to air and moisture. It seems probable, however, that, in the generality of cases of seasoning timber by immersion, only the outer layers of the wood are thoroughly washed, and even this requires several years, in the case of large logs.

The "Beerizing" process, quite recently patented by Sigismund Beer, of this city, is designed to season the timber by dissolving the albumen contained in the pores of the wood. A solution of borax is used for this purpose, which is said to dissolve the albumen completely. Borax being highly antiseptic in its nature, the solution can be allowed to remain in the wood, but, if its dark color is an objection, it can be readily be washed out. This process seems to be deserving of great attention, for it is evident that, if it accomplishes what the inventor claims, it effects in a few hours that which the air seasoning or immersion in water never does thoroughly accomplish—a complete removal of all the elements of decay from the timber.

[*To be continued.*]

How English Gun-barrels are Made.

At a recent meeting of the Birmingham (England) Gunmakers and Inventors' Club, Mr. Samuel Smith, a practical gun-barrel maker, read a paper on this branch of manufacture, of which the following is an abstract:—

"The material used for gun-barrels was mostly charcoal iron. For plain and figured barrels, at the date of which I am speaking—viz., 1793—the iron used was Stub, Stub-twist, Wire-twist, and Damascus. Stub-twist was first made as plain stub, but, instead of being hammered into a 'skelp,' or flat plate, it was drawn into a strip, coiled round a mandrel, and welded in the usual way. Stub-twist is now made of old horseshoe nails and steel cuttings, about 2 inches long, ¼ inch in breadth, and the same in thickness. The two are mixed up together and 'balled' in a furnace, and the bloom drawn out under the forge hammer. It is then rolled into a strip, coiled round a mandrel, and welded as before. If the balls are very large, or the stubs or steel of inferior quality, the iron will not be good. Plain stub barrels were made of the same iron, forged into a skelp, and welded longitudinally.

"Damascus and wire-twist are now made by 'piling' plates of iron and steel alternately. The plates are about 3 inches broad and ¼ of an inch thick. From sixteen to twenty are piled on top of each other; they are then placed in a furnace and raised to a welding heat, drawn down under a forge hammer, and rolled into square rods ⅜, 7-16, ½, and 9-16 inch, according to the size of the barrels required. The wire-twist is rolled so as to show the edges of the different plates on the flat of the strip, so that when it is welded together it looks like a coil of wire from one end of the barrel to the other. The Damascus is rolled into square rods; these are cut into suitable lengths, heated white-hot, and twisted until they become round like a screw. Two or three of these are welded together, and then rolled down to rods the size required. These are then coiled round a mandrel, and welded in the usual way.

"There is another iron, called silver steel. It was first made about forty years ago, I believe, by Mr. Whitehouse, of Wednesbury, by laminating Swedish iron and steel, like Damascus, but not with so many layers. It is very good. The figure is not much better than the iron that is now called single iron Damascus, but it was a very strong iron. The silver steel that is now made is rolled into a square of 7-16 inch, and worked like Damascus. Two rods are welded together and rolled down to the size required, and welded in the same way as other twisted barrels. This iron is now made both at Adams's and J. Clive's. There is not so much used as formerly.

"About 45 years ago, J. Clive began to make iron for gun-barrels, and the best iron is now made by Mr. G. Adams and J. Clive, who may be said to be indeed the only makers of 'best twist' gun iron. The iron now in use is of six qualities—1st, skelp-twist, price 2*d.* per lb.; 2d, iron-twist, 3*d.* per lb.; 3d, fourpenny stub, 4*d.* per lb.; 4th, fivepenny stub, 5*d.* per lb.; 5th, silver steel, 7*d.* per lb.; 6th, Damascus, 7*d.* per lb. No. 2 is twisted into a screw, like Damascus, and is called iron Damascus. This is worked in single rod and double rod—that is, two rods put together, and rolled into a strip. The same is done with fourpenny stub and fivepenny stub, and the result is called stub Damascus, but cheap guns are chiefly made of the iron Damascus. This is the cheapest figured iron. It contains no steel, being generally made of waste screws mixed with other scrap. It requires experience to distinguish it from the true steel Damascus.

"*Welding.*—Best barrels are welded by coiling the strip round a mandrel, and then beating it to a welding heat in a smith's fire, it is then taken out and jumped upon an iron plate on the floor, then put in a swage with a 'stamp' or mandrel inside, and hammered down. About three inches are welded at a time. Here I may observe that there are very few welders who use the 'stamp,' except for a few inches at each end; but best barrels ought to be welded on a stamp throughout.

"*History of Gun-iron.*—Mr. R. Adams began to make twist-iron about the year 1815. He was before that time a tilter of barrel skelps or plates for making plain iron barrels. At that time a great deal of iron was made from swaff or filings, which were first washed, and then mixed with scrap, made into a ball, and welded in a smith's forge; this was called 'swaff ball drawing.' It made very good iron, and was used by lock forgers, breech forgers, and occasionally made into barrels for fowling-pieces. In the early time of the barrel trade there were a number of small forges for making barrel skelps by tilting; one in particular was at Wednesbury Bridge, and here Mr. R. Adams, above mentioned, worked; and there is no doubt that he saw what the trade required. At the close of the French war he began to make twist iron as a trade. Before this time it had been made at various forges, but no one made a specialty of this kind of iron. Mr. Adams continued working at Wednesbury till unfortunately killed by the bursting of a boiler, after which Mr. G. Adams took up the business, and continues to make twist gun iron at his new works, in Church-lane, West Bromwich, up to the present day.

"*Boring.*—After the barrels are welded they go to the mill. They are first rough-bored. This is done by fastening them in a socket or holder; the 'bit' is a square steel 'rimer,' of suitable length, running at about 500 revolutions per minute, which is forced through the barrel. The fine-borer then examines the barrel, 'sets' or straightens it, and then it is 'spilled up,' a process the same as rough-boring, except that the bit does not cut on all the edges; it has a 'spill,' or piece of oak-wood put on one side, which causes it to cut much more evenly. The workman then 'sets' the barrel, and finishes the boring, which is done at a speed of 70 to 80 revolutions per minute. The bit only cuts on one edge, which is left sharp, and a deal spill is used, packed up with strips of paper as the boring proceeds. The barrel is examined, and 'set' several times during the operation. The setting is done by the shade or reflection down the inside of the barrel, from the top of the window. It is an art that can only be acquired by long practice and perseverance. Some men have worked at the trade all their lives, and have never learned to set a barrel correctly. The same process is used for sporting and military barrels up to the fine-boring. After fine-boring, the military barrels are turned, or stripped, as it is called, which is done by a self-acting slide-lathe, which takes off the thick side, if they have any. The grinder then finishes them to the gauge. The history of boring and setting I cannot attempt to state, but setting, I think, does not go back much more than 100 years. My father began to work as a fine-borer in the year 1793. Setting was known then, but not generally. He had to pay for the secret. According to my father, a man named P. Parsons was the first to set barrels that he had heard of. He worked at Duddeston Mill, being what was called a 'best workman' at sport-

ing barrels. This Mr. Parsons used at first for the purpose of setting a string or wire, which was drawn tightly by a bow, or otherwise, and applied to the inside of the barrel. By this means he discovered the crooks, and then corrected them with a hammer. The process of fine-boring is the same now as it was in 1793; that is, it is done with a square bit, but only two edges cut, and only one at a time. The advantage of taking off the edges was said to be discovered about 1790, by Mr. Beesley, and this was kept a secret among good workmen for a long time. I think we may be sure that boring and setting had not attained their present perfection until the beginning of the present century.

"In the year 1787, there were 27 gunmakers in Birmingham, and barrels were made, bored, and ground at water-mills all round the town. Such mills still exist, chiefly in the neighborhood of Hales Owen, where large numbers of barrels are now made. I have not touched on the subject of rolled barrels, which are chiefly used for military firearms and the commoner sort of sporting guns. The rolling of barrels from short taper skelps, a foot or more in length, is comparatively a recent process. The barrel is drawn over an oval-headed mandrel, so fixed that its head is immediately between the grooves of the upper and under roll. These grooves are of a shape corresponding to the outline of the barrel. Of late years, steel barrels have come very much into use for rifles, but to a very small extent for sporting guns as well, the want of 'figure' operating much against them. Steel rifle barrels are sometimes drilled out of a solid bar, which must be 'set' from time to time, as the drill is certain to run out. As there is usually more to turn off one side, they are generally of unequal hardness, and is a difficult matter to keep them straight. Steel barrels are now usually rolled from 12 to 15 inch drilled blanks, the hole in which is much larger than the intended bore. The punching of shorter blanks, which were afterwards rolled out into a barrel by two rollings, constituting the patent of Deakin and Johnson, appears now to be discontinued, though very good barrels were made by the process.

"The reading of Mr. Smith's paper was accompanied by practical illustrations of the method of 'shading' barrels, or detecting internal or external irregularities. Barrels, straight and bent, were supported at each end, and Mr. Smith explained the entire process, which has been kept very much as a secret by the very few who really understand it. So delicate is this test, that the distortion produced by warming one side of the barrel with a common candle was distinctly perceptible. Independently of its practical utility, the 'shading' of a gun-barrel is an exceedingly interesting optical problem, which has never yet been investigated."

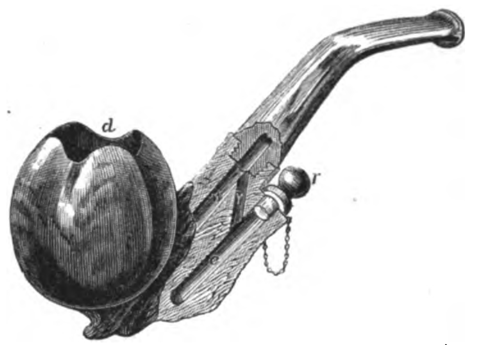
Wanted—A Coal-hole Cover.

CANNOT some philanthropic inventor discover a substitute for the smooth iron covers of coal-slides in our streets? In frosty weather, or especially after a slight fall of snow, these covers become as slippery as a Ring politician, and a constant trap to unwary pedestrians. Awkward falls are not the least serious results; broken bones sometimes make a still less pleasant consequence of the tumble. Now this danger it seems might be easily avoided by corrugating the iron covers, or substituting for them in many cases stone ones. It is a trifling matter, perhaps, but it is such trifles which make the difference between comfort and discomfort in life.—*New York Times.*

DWYER'S PATENT SMOKING PIPE.

THE engraving herewith presented (a side view and partial section) represents an improved tobacco pipe, termed the "Sweet Smoker" by the inventor, Mr. P. J. Dwyer, of Elizabethport, N. J., by whom it was patented March 7, 1871. The improvement relates to that class of pipes in which a chamber is used for the reception and collection of the moisture which accumulates within the stem or tube in smoking. Among other advantages, it provides for the emptying of such chamber without removing the stem of the pipe from the bowl, which operation, when constantly performed, wears away the joints and causes a leak in the pipe; and also without interfering with the direct passage from the bowl to the mouth-piece.

Instead of giving to the passage W (which forms the communication between the bowl and stem of the pipe) an irregular course, as is done in most pipes, the inventor makes it in a direct line with the stem, thereby greatly facilitating the clearing of the pipe by a wire or straw inserted through the stem. The shank of the pipe is enlarged on the under side, and contains a chamber, E, which is arranged under the bowl. This chamber has a mouth under the stem. The



mouth is fitted with a plug, R. The chamber has no communication with the bowl of the pipe except through the passage, W, with which passage it is connected by a passage, Y, the direction of which is downward from the said passage into the said chamber. As this cross passage, Y, is much nearer a vertical position than the passage, W, any moisture which may be collected in the passage, W, either from the tobacco or from the mouth, will, as soon as it arrives at said passage, Y, drop through into the chamber, E. When the chamber, E, becomes full it may be emptied while the pipe is charged, as it is only necessary to remove the plug, R, and tip the pipe till the mouth of the chamber is sufficiently low to allow its contents to run out. In case of the passage, W, and stem becoming choked by any solid or viscous matter, a straw or wire can be run directly through them without meeting with any obstruction from the chamber, E, or passage, Y. To clean passage, Y, bend the straw or wire towards chamber, E. The inventor is desirous of disposing of the entire right to this improvement, and will be pleased to respond to communications directed to the address hereinbefore given.

FARMING ONE HUNDRED YEARS AGO.—In 1790, Franz Fuss, of Bohemia, one of the authorities of his age, spoke of the prevalence of the inventive spirit, which he denounced. He was himself a witness that "the folly had been pushed to such an extent" that people were trying to make sowing and reaping machines. But he "thanked God" that the farmers had still *some* judgment left, and thus these stupid efforts to get something new met with their proper reception—neglect.

Testing Life-boats.

THERE will be a trial of surf and life-boats at Seabright, on the New Jersey coast, on Monday the 27th of May, at eleven o'clock A.M., for the purpose of testing the adaptability of such boats as may be presented to the use of the life-saving service. A commission to determine upon the qualities of the boats will be appointed at an early day. All persons desiring to compete in the forthcoming trial will be required to be present with their boats at the time and place above named. Should the day prove inauspicious, the first fair day following will be taken for making the tests.—*Washington Patriot.*

Electric Probe for Wounds.

IN the last general assembly of the Scientific Association of France, M. Trouvé exhibited and described his probe for the search and extraction of foreign bodies remaining in wounds. Surgeons have at all times been occupied with the discovery of a simple and practical means capable of revealing to them to a certainty the presence of any foreign body in the tissues. Since Garibaldi's wound two plans have been proposed, the one frictional and the other electrical. That by friction (Dr. Nélaton's plan) was preferred to the employment of electricity, proposed by M. Favre, of Marseilles, which was the subject of a communication to the Academy of Sciences. The style or probe which Dr. Nélaton uses to discover the presence of a ball has at its extremity a small "rugous" or wrinkled porcelain ball, which becomes blackened in contact with a leaden bullet. This plan is, without doubt, ingenious, and in this special case of great utility; but the services which it can render are very limited. In fact, the body the presence of which it is sought to verify must be of lead, and the wound should not be closed, very straight, nor even very curved. This verification becomes even impossible when, as frequently happens, the bullet is encysted or covered with a portion of muscle or cartilage, or even with a fragment of the clothing of the wounded person.

The solution of a problem so complex and difficult was the object of M. Trouvé in developing the idea emanating from M. Favre, which, in spite of his meritorious efforts and those of De Kovacs, of Pesth, has not yet supplied the satisfactory solution. It is known that M. Favre proposed two Daniell's elements and the use of a galvanometer.

The apparatus of M. Trouvé consists of three distinct parts: a battery, a probe, and an indicator (révélateur). In principle it is founded on the difference in conductibility between metals and other bodies. The battery is formed of a zinc and carbon element, inclosed in a case of hardened india rubber hermetically sealed; the exciting liquid being bisulphide of mercury. The probe is a pipe, flexible or rigid, constructed so that the preliminary probing may be effected, and then the stylets of the indicating apparatus may be introduced. The indicator contains in its interior a very small electro-magnet, with a vibrator and two small rods of steel, very sharp and insulated from each other; and as soon as these points, which are in connection with the battery, touch any metallic substance, the vibrator begins to move.

With this apparatus it is possible to distinguish the different metals from one another. If the metal is lead, the trembler vibrates regularly; if however, it is iron or copper, the trembler has a jerky movement. Iron may be distinguished from copper by its action upon the needle of a galvanometer.

Colorado Mining Prospects.

A GENTLEMAN writing from Georgetown, Colorado, says of the mining interests of that region :—

"The development of our silver mines has been very slow. About six years have now passed since it was known that we had these fissure veins of silver ore, which is as rich as that of any country in the world. More than half of this time has been spent by the mine-owners in trying to sell. Most of them only dug a hole ten feet deep—and they would hardly have done that much, had not the law of the Territory required it of them. Up to the present time we have had only two mills doing custom-work on bought ore. But a new and better idea has taken possession of us now, and we have all gone to work. We have reduced the price of treating ores from $100 per tun to $35, and, under certain circumstances, even less. The price of packing ore from the mine to the mill is reduced from $30 to $8 per tun. We find that we can always get a good price for our ore, and that we have many different ways of disposing of it. The low-grade ores we take to our own mills; if it is rich, we can send it to Newark, N. J., or to England. Agents of the smelting works in Swansea are here, who are glad to pay at any time 85 per cent. of the silver actually contained in the ore, and advancing us 50 per cent. of the amount when the ore is shipped. When it arrives in Swansea it is sold in open market, and we obtain the highest price offered. All this is much more satisfactory than the old chancery business of making sales. Of course, we want capital yet, and we want intelligent, practical men to come with it. We have had more than our share of speculators; now we want miners. In the adjoining county, which is the center of the gold region, there are several hundred mining companies. Millions of dollars were invested there; and to-day, if there is one company which is making a dollar, I don't know it. The most valuable property in the county is owned by companies, and they are all either out-at elbows or disgusted with the business. The English companies in the county are, as a rule, successful. They send out good mining engineers, and manage their affairs in a cautious, prudent manner. We are only now beginning to advance in the right direction, but now that we have made the right kind of a start, I think we will rapidly develop into one of the most prosperous mining communities in America.

The prices paid for ores at present are these :—Our own mills which work up all the low grade ores—assaying 100 ounces and under—pay for the first forty ounces $1 15, and $1 15 for each ounce over 40, or $84 dollars per tun. The Boston Smelting Company at Black Hawk pays from $1 to $1 23 per ounce for all contained in the ore. The Newark and Swansea works pay 85 per cent. of the assay, and also pay for the lead. Miners' wages at present are from $3 to $4 per day. Miners who "batch" can live well on $5 per week, or good board can be obtained for $7 per week. The best chance for a poor man here is prospecting. I never knew an intelligent prospector who stuck to it who did not succeed. There is always an open field for him, new districts are discovered every year, and the old districts are only skimmed as yet. The discoveries made in this, the oldest silver district in the Territory, last year, have proved more valuable than any previously made. At least one-half of the silver now produced in the country comes from mines which one year ago were unknown. The men who found them were hardly able to pay for the pick and shovel they worked with while prospecting.

The Action of Bilge Water.

UNDERLYING the inquiry conducted by the *Megæra* Commission is a large scientific question—one that will press for solution long after the specific calamity which has given it such late prominence shall have faded from the public mind if not from the public memory. The maxim of all being well that ends well is comfortable enough in its application to many eventualities of life, but if accepted in reference to the loss of the *Megæra*, or any case similar, the solacing maxim is not only very much out of place, but if practically acted upon may evolve an infinity of harm. The foundering of the *Megæra* did indeed occur without attendant loss of life, but such a result was so very much against the ordinary evolution of the laws of chance that a similar foundering could not be rationally expected to yield a similar finality. It is right that practical scientific men, putting aside the veil of political and personal casuistry with which the *Megæra* case has been environed, should calmly apply themselves to a solution of the problem how best to protect the interior or hold of an iron ship from the corrosive effects of bilge water. Be the responsibility of having dispatched the *Megæra* on an antipodean voyage allocated to whom it may, this one thing seems clear, viz., that the dangerous thinning of the iron plates, owing to which cohesion at length yielded in a certain spot, and sea-water rushed through, is not attributable to corrosive oceanic action from without, but to the solvent power of bilge water acting within. Now this is very important. We are of opinion, indeed, that the deteriorating and disintegrating effect of bilge water on iron bottoms has never yet evoked the attention which the importance of it merits. Doubtless the protection of the exterior of an iron bottom against the solvent action of sea-water is a matter of considerable, we will even admit of great, difficulty, but the case is one of those which are so far satisfactory, that whatever destructive action may be effected on a ship's bottom is at any time discoverable without much trouble. It is unnecessary that an iron ship should be dry-docked in order to reveal the amount of disintegration. The examination of an expert diver is usually sufficient, and a diver usually belongs to the crew of every well-appointed iron ship—certainly every iron British ship of war. Contrary to what might have been expected, the examination of the interior of an iron ship's bottom is a task greatly more difficult than any outside examination, whereby, other things equal, danger from bilge water corrosion is proportionately greater than danger from external or oceanic agency. Let us now inquire what indications science has to give as to the best seeming means of obviating internal corrosion. Does science suggest that the means of protection shall be identical for both internal and external preservation, or that differences shall be recognized co-ordinate with functional differences between the two cases? First of all, it will be well to inquire what the indicated means are for preventing the oxydation or other chemical degradation of a material subject to given chemical influences. Evidently the means indicated are twofold. First, if by any treatment we could succeed in actually covering the surface designed to be protected with some material upon which the chemical influences given by terms of the problem have no effect, the protective result would be achieved. Secondly, if we could so alter electric conditions that the surface to be protected should be placed under the protection of an agent more naturally prone to be acted on by the given chemical agents than itself, then also the result aimed at would be attained. Applying, now, these principles, it will be found that the cementing of an iron surface with the intent of guarding it against all contact with water corresponds to the first indication, and the setting up of altered electric polarities by contact with a more oxydizable metal than iron—zinc, for example—corresponds to the second.—*English Paper.*

Improved Furnace.

FOR reducing oxyds and obtaining metals, not only iron, but potassium, sodium, and the like, an English inventor proposes to use an apparatus constructed as follows :—

"The furnace is like an ordinary blast-furnace, but the top is covered in and fitted with various valved inlets or doors for the introduction of the materials. There is a central inlet for coal or carbonaceous matter, and a set of inlets round it for the ores of oxyds, the silicates, aluminates, or other salts, and the lime or flux. Exhausting apparatus draw the gases out of the furnace. Only a comparatively small portion of the coal is to be introduced by the central inlet at the top, the larger portion being put into chambers of channels formed at the sides of the lower part of the furnace. Passages are formed in connection with the hearth at a suitable height for the slag to flow off by, leaving the iron in the bottom of the hearth to be withdrawn by a separate outlet; and the air-supply enters by what may be termed the slag passages, and takes up heat from and so cools the slag. The air thus heated finds its way into a gallery formed round the lower part of the furnace, whence it enters the interior, first passing through the coal or coke in the bottoms of the lateral coal-chambers, and thereby having its oxygen converted into carbonic oxyd. The coal in the chambers becomes gradually coked through the action of portions of the hot gases resulting from the combustion in the lower part, and passing up through it, and the gases and vapors evolved from it are led by suitable passages into the interior of the furnace, to assist in reducing and heating the ores. At and above the part of the furnace where the reducing action terminates, air is admitted to complete the combustion."

CUTTING MARBLE, ETC.—A recently devised foreign apparatus for stone-cutting uses comprises a head that can be rapidly rotated and provided with diamond cutters, so arranged that while each cutter removes material and traces a path over the molded surface to be produced, all the cutters produce wrought surfaces free from distinct scratches. For cutting mostly on a horizontal face, the head is solid in which the diamonds are mounted. For molding on an edge, the cutter-head holds bits of steel studded with black diamonds. A rotary tool is shaped to finish the groove, and preferably formed of brass. For cutting as with a saw into marble a small round vertical spindle is used, the surface of which is studded with black diamonds or carbon points, so arranged in rows that the cutting points of the different rows merge their paths of action, so as to cut the whole length of the cutting plane of the shaft.

A PATRIOTIC citizen boasts that "no people on the earth can excel the Americans in the manly art of sitting on a bench and watching eighteen men play base ball."

OFFICIAL LIST OF PATENTS

ISSUED FROM THE UNITED STATES PATENT OFFICE

For the Week ending April 23, 1872,

AND EACH BEARING THAT DATE.

[*Reported officially for the "American Artisan."*]

PATENT CLAIMS, DRAWINGS, AND SPECIFICATIONS.—*Owing to the constantly increasing number of patents issued, we have—as we must have done sooner or later—ceased to publish the Claims, and instead thereof we publish the names of the patentees, with the titles of their inventions, with descriptions on another page of some of the more important inventions; but we are prepared to furnish immediately on application, or by return mail, when requested by letter, a copy of the claims of any existing patent, for - 75 cents. We also furnish a printed copy of the whole specification of any patent issued since November 20, 1866, for - - $1 25 We will also supply a sketch of the parts claimed in any patent, or a full copy of the drawing thereof, at charges varying from $1 upwards.*

ADVICE TO INVENTORS AND PATENTEES.

Whenever asked, we will promptly send, gratis, our recently published pamphlet, entitled "IMPORTANT INFORMATION FOR INVENTORS AND PATENTEES," *containing details of the proceedings necessary to be taken by inventors desirous of obtaining Letters-Patent in the United States. Also, Instructions to Patentees concerning Re-issues, Extensions, Infringements, Foreign Patents, etc.*

Address BROWN, COOMBS & CO., *Solicitors of American and Foreign Patents, 189 Broadway, New York.*

125,876.—BUTTER-DISH DRAINER.—Friend C. Booth, assignor to the Meriden Britannia Company, West Meriden, Conn.

125,877.—CORSET.—Morris P. Bray, New Haven, Conn.

125,878.—PIE-TONGS.—James F. Brewer, Plantsville, Conn.

125,879.—FASTENING FOR THE MEETING-RAILS OF SASHES.—Frederick W. Brocksieper, assignor to Sargent & Co., New Haven, Conn.

125,880.—UNIVERSAL-JOINT COUPLING FOR CONNECTING-SHAFTS.—Melville Clemens, Boston, Mass. Ante-dated April 6, 1872.

125,881.—UNIVERSAL-JOINT COUPLING FOR CONNECTING-SHAFTS.—Melville Clemens, Boston, Mass. Ante-dated April 6, 1872.

125,882.—DIFFERENTIAL PULLEY-BLOCK.—George F. Clemons, Springfield, and Melville Clemens, Boston, Mass. Ante-dated April 6, 1872.

125,883.—FIRE-ENGINE.—Clement Cleveland, New York City, and William C. Cleveland, Ithaca, N. Y.

125,884.—NOZZLE.—Randolph R. Craig and Joseph Craig, Nevada City, Cal. Ante-dated April 13, 1872.

125,885.—HARNESS-ROSETTE.—John W. Dayton, Waterbury, Conn.

125,886.—DEODORIZING NIGHT-SOIL, ETC.—Julius Edmund Dotch, Washington, D. C. Ante-dated April 9, 1872.

125,887.—WINDOW-BLIND.—George M. Fowler, Seymour, Conn.

125,888.—GAS-GENERATOR.—Isaac W. Fox and David H. Irland, Chicago, Ill.

125,889.—TAILOR'S PRESS-BOARD.—William Frizzell, Boston, Mass.

125,890.—BALING PRESS.—William Golding, New Orleans, La.

125,891.—LOCOMOTIVE.—Henry N. Hamilton, Armonk, N. Y.

125,892.—APPARATUS FOR STRAIGHTENING CYLINDERS.—Thorvald F. Hammer, Branford, Conn.

125,893.—SOLDERING-IRON.—John W. Hoard, Providence, R. I. Ante-dated April 6, 1872.

125,894.—BLACKING-SPREADER.—Hugh S. Kerr, Philadelphia, Pa.

125,895.—MOP-HEAD.—Stephen C. Ketchum, assignor of one-half interest to J. J. G. Ball, Winchendon, Mass.

125,896.—WASHING MACHINE.—Jacob Killinger, Lancaster, Pa.

125,897.—APPARATUS FOR BLEACHING, DYEING, AND FINISHING TEXTILE FABRICS.—Joseph Lea, Philadelphia, and Jonas Eberhardt, Conshohocken, Pa.

125,898.—HAND-RAIL.—Marcus M. Manly, assignor to himself and Sellers Brothers, Philadelphia, Pa.

125,899.—HANDLE FOR CROSS-CUT SAWS.—Alexander C. Martin, Cincinnati, Ohio.

125,900.—DETACHING-HOOK FOR BOATS.—William H. Miles, Philadelphia, Pa., assignor to Louis Walton, New York City.

125,901.—VENT-PLUG.—Edward Mill and Albert S. Wetmore, Cleveland, Ohio.

125,902.—WAGON-BRAKE.—Andrew S. Notestein, assignor of one-half his right to Robert Russell, Luray, Mo.

125,903.—VEST.—Zechariah Ober, Boston, Mass.

125,904.—THRASHING MACHINE.—Solomon E. Oviatt, West Richfield, Ohio.

125,905.—PERMUTATION LOCK.—Oliver E. Pillard, assignor to Frederick H. North, New Britain, Conn. Ante-dated April 3, 1872.

125,906.—ASH-SIFTER.—Alfred H. Pulcifer, Brooklyn, N. Y.

125,907.—STEAM-GENERATOR.—David Renshaw, Syracuse, N. Y.

125,908.—MACHINE FOR MANUFACTURING PLOWSHARES.—Daniel H. Rowe, Martinsville, Ill.

125,909.—BLANK OF WHICH TO CONSTRUCT INTEGRALLY THE LAND-SIDES AND SHARES OF PLOWS.—Daniel H. Rowe, Martinsville, Ill.

125,910.—CIGAR-BOX.—Henry Schmeer, Syracuse, N. Y.

125,911.—CLIPPING-SHEARS.—Roswell T. Smith and Joseph K. Priest, assignors to themselves, William Earl, and J. G. Blunt, Nashua, N. H.

125,912.—MACHINE FOR COLORING CAPSULES FOR BOTTLES.—Henry Stiassny, New York City, assignor to John J. Crooke, Southfield, N. Y.

125,913.—MIRROR AND FRAME-HANGER.—John S. Thomson, Camptown, Pa.

125,914.—PHOTOGRAPHIC CAMERA.—Hector W. Vaughan, San Francisco, Cal.

125,915.—APPARATUS FOR PREVENTING THE BREAKAGE OF LAMP-CHIMNEYS.—Batista Vitalis, Athens, Greece.

125,916.—PIPE-COUPLING HOLDER.—Batista Vitalis, Athens, Greece.

125,917.—CASTING CAR-WHEELS.—Nathan Washburn, Worcester, Mass.

125,918.—FEED-WATER HEATER FOR STEAM-GENERATORS.—Horatio N. Waters, Meriden, Conn.

125,919.—BOILER-FLUE SCRAPER.—Allen Way, Painesville, Ohio.

125,920.—UNISON STOP FOR PRINTING-TELEGRAPHS.—Martin F. Wessmann, Brooklyn, N. Y.

125,921.—CLASP FOR SIDE-ARMS.—Frederick A. Will and Julius Finck, San Francisco, Cal.

125,922.—TOOL-HANDLE.—Frederick A. Will and Julius Finck, San Francisco, Cal. Ante-dated April 13, 1872.

125,923.—ROCK-DRILLING MACHINE.—Arthur David Williams, London, England.

125,924.—RIVETING DEVICE.—Thomas J. Allison, Turnersburg, N. C.

125,925.—RAILWAY SIGNAL.—Joseph F. Andrews, Nashua, N. H.

125,926.—BAND-CUTTING FORK.—David Arnold, West Lodi, Ohio.

125,927.—FERTILIZER.—Joseph Ramsey Black, Ninety-six, S. C.

125,928.—REVOLVING MILK-RACK.—Harry Blake, Panama, N. Y. Ante-dated April 13, 1872.

125,929.—FRUIT-DRIER.—Charles A. Boynton, Vineland, N. J.

125,930.—PLOW.—William B. Bradford, Charlotte, N. C.

125,931.—HAND CORN-HUSKER.—Alexander W. Brinkerhoff, Upper Sandusky, Ohio. Ante-dated April 9, 1872.

125,932.—DIE FOR SHAPING BAILS FOR TEA-KETTLES.—James Britton, New York City.

125,933.—COMPOUND FOR CURE OF COLIC AND BOTTS IN HORSES.—John Burns, Jefferson County, Ohio, administrator of Thomas Burns, deceased.

125,934.—GRAIN-STEAMING APPARATUS.—Samuel W. Campbell and James C. Evans, Kansas City, Mo.

125,935.—CART-BODY CATCH.—Charles F. Chew, Swedesborough, N. J.

125,936.—CULTIVATOR.—Cornelius M. Clark, Seward, Neb.

125,937.—GOVERNOR-VALVE FOR STEAM-ENGINES.—William H. Cowles, Erie, Pa.

125,938.—FIRE-PLACE.—Samuel D. Dearman, Rock Hill, S. C.

125,939.—FERTILIZING COMPOUND.—Joseph M. Deering, Boston, Mass., assignor to J. P. Cilley, Rockland, Me.

125,940.—MACHINE USED IN THE MANUFACTURE OF CHAINS.—William C. Edge, Newark, N. J.

125,941.—APPARATUS FOR THE MANUFACTURE OF GAS FROM PETROLEUM.—Henry H. Edgerton, Fort Wayne, Ind.

125,942.—GAS-REGULATOR.—G. Morgan Eldridge, assignor of two-thirds of his right to Thomas K. Brown and William Wallace Goodwin, Philadelphia, Pa.

125,943.—PROCESS FOR PURIFYING ILLUMINATING-GAS.—Robert J. Everett, assignor to William H. Adams, Bridgeport, Conn.

125,944.—BALING-PRESS.—George F. Felton, De Pere, Wis.

125,945.—APPARATUS FOR SEPARATING AND COLLECTING YEAST FROM THE FROTH OF FERMENTING-TANKS.—Charles Fleischmann, assignor to Fleischmann & Co., Cincinnati, Ohio.

125,946.—MACHINE FOR TRIMMING THE EDGES OF LEATHER, ETC.—William F. Foley, Albany, N. Y.

125,947.—GATE.—Ferdinand Friedrich and Charles H. Allen, Platteville, Wis.

125,948.—MACHINE FOR TRIMMING CASTINGS.—Alonzo S. Gear, Boston, Mass.

125,949.—MACHINE FOR WORKING STONE.—Alonzo S. Gear, Boston, Mass.

125,950.—WASHING-MACHINE.—Newton C. Goodloe, Okalona, Miss.

125,951.—LINING FOR FURNACES, SAFES, ETC.—Augustus C. Hamlin, Bangor, Me.

125,952.—TYPE WRITING-MACHINE.—Hans R. M. J. Hansen, Copenhagen, Denmark.

125,953.—COOKING-STOVE.—Joseph D. Harden, assignor of one-half of his right to H. & H. S. Church, Troy, N. Y.

125,954.—LAMP FOR BURNING HEAVY OILS.—Robert Hitchcock, Watertown, N. Y.

125,955.—HUB FOR VEHICLE-WHEELS.—Sylvanus B. Hitt and Robert W. Chapman, Waterloo, Iowa.

125,956.—SHUTTLE FOR SEWING-MACHINES.—William H. Hockensmith, Bridgeport, Conn.

125,957.—COMBINED KNOB-LATCH AND LOCK.—John Imray, London, England.

125,958.—WEATHER-STRIP FOR WINDOW-SASHES.—Richard A. Jackson, assignor to himself, John A. Kurtz, and Samuel Gissinger, Pittsburg, Pa. Ante-dated April 3, 1872.

125,959.—SPRING FOR RAILWAY-CARS.—Henry Jeffrey and Henry Fisher, Aurora Station, Ind.

125,960.—MAP AND CHART-RACK.—Frank G. Johnson, Brooklyn, N. Y.

125,961.—CULTIVATOR.—Hugh Paxton Jordan, Victoria, Tex.

125,962.—VENTILATOR FOR HATS.—Abijah O. Knapp, assignor to the Tweedy Manufacturing Company, Danbury, Conn.

125,963.—BREECHING STAY FOR HARNESS.—William R. Knowles, Columbiana, Ohio.

125,964.—OYSTER-DREDGE.—Thomas W. Landon, Fairmount, Md.

125,965.—APPARATUS FOR ATOMIZING, INHALING, AND INJECTING LIQUIDS AND GASES.—William R. Leonard, New York City.

125,966.—CURTAIN-FIXTURE.—Thomas Lovell, Cincinnati, Ohio.

125,967.—CAR-COUPLING.—George W. Loyd, assignor of one-fourth his right to F. M. Arnett, and one-twelfth his right to Joseph Recknor and Norman Recknor, Markleysburg, Pa.

125,968.—POTATO-DIGGER.—James M. Lumbard, Decatur, Mich.

125,969.—RAILWAY-CAR.—Isaiah G. MacFarlane, Wilkinsburg, Pa.

125,970.—LINK-BLOCK FOR SLIDE-VALVES.—Edward Marsland, Sing Sing, N. Y.

125,971.—BALING PRESS.—Adam W. Mason, Station 2 (P. and G. R. R.), Fla.

125,972.—PAINT COMPOUND.—Samuel F. Mathews, Harrisburg, Pa.

125,973.—INKSTAND.—Thomas J. Mayall, Boston, Mass.

125,974.—MANUFACTURE OF UMBRELLAS.—John McAuliffe, New York City.

125,975.—SAWING MACHINE.—Cornelius B. Morehous, Washington, Iowa.

125,976.—CYLINDER FOR STEAM-HAMMERS.—Thomas R. Morgan, assignor of one-half his right to Charles E. Marchand, Pittsburg, Pa.

125,977.—EGG-CARRIER.—Edward L. Mueller, St. Louis, Mo.

125,978.—HOISTING MACHINE.—William Neal, Louisville, Ky.

125,979.—MODE OF ATTACHING PYROXYLINE BASE TO ARTIFICIAL TEETH.—Marcellus Newton, Boston, Mass.

125,980.—SCREW-CUTTING DEVICE.—Stephen North, Syracuse, N. Y.

125,981.—CAR-TRUCK.—Samuel N. Norton, Sacramento, Cal.

125,982.—THILL-COUPLING.—Sylvester O'Haire, assignor to himself and Alexander Shiland, West Troy, N. Y.

125,983.—MACHINE FOR SCREW-CUTTING AND OTHER PURPOSES.—Pierre Olinger, Jersey City, and Henry S. Manning and Darwin A. Greene, New York City, assignors to Henry S. Manning, New York City.

125,984.—BAND-SAW MILL.—Henry Peterson, East Germantown, Ind.

125,985.—CAR-COUPLING.—Henry W. Pike, Middleport, N. Y.

125,986.—BRAID-GUIDE FOR SEWING-MACHINES.—John B. Price, Thompsonville, assignor to Weed Sewing-machine Company, Hartford, Conn.

125,987.—PUDDLING AND BOILING FURNACE.—Abram Reese and Jacob Reese, assignors to themselves and Reese, Graff & Co., Pittsburg, Pa.

125,988.—BREECH-LOADING FIREARM.—Orvill M. Robinson, Plattsburg, N. Y.

125,989.—BURNING HYDROCARBONS AND BAGASSE.—Euphemon S. Roman, Cantrelle, La.

125,990.—MARBLE-WORKING MACHINE.—Anton Saffer, New York City. Ante-dated April 17, 1872.

125,991.—COMBINED BUREAU AND WASHSTAND.—Joseph Schneeman, New York City.

125,992.—HAY-LOADER.—Robert Shaw, assignor of one-half his right to A. J. Mershon, Warsaw, Ind.

125,993.—FEED-WATER REGULATOR AND LOW-WATER ALARM FOR STEAM-BOILERS.—John B. Smith, Milwaukee, Wis.

125,994.—OVERALL.—Eli F. Stacy and John H. Stacy, Gloucester, Mass.

125,995.—DOOR-SPRING.—Friedrich Stemmler, East New York, N. Y.

125,996.—MACHINE FOR STRAIGHTENING TUBES, BARS, AND SHAFTING.—Arthur Watkin, Pittsburg, Pa.

125,997.—TABLE.—Rudolph Weber, Etna Borough, Pa.

125,998.—CARRIAGE-ROCKER.—Augustus L. Wells, assignor to A. L. Wells & Co., Hopkinton, R. I.

125,999.—TURN-BUCKLE.—Malcom White, assignor of one-half his right to John Gibbs, Brooklyn (E. D.), N. Y.

126,000.—CAR-COUPLING.—Charles Whitus, assignor to Edward C. Smith and William Martin, Jun., Philadelphia, Pa.

126,001.—SEED-DROPPER.—William C. Willey, assignor to himself and J. H. Ellis, Limerick, Ill.

126,002.—LAMP-WICK ADJUSTER.—Henry Woodbury, Huntsville, Mo.

126,003.—BUCKLE.—Herman B. Worcester, Chicago, Ill.

126,004.—GLASS DOOR-KNOB.—Alonzo E. Young, Boston, Mass.

126,005.—WASH-BOILER.—Gaylord W. Adams, Candor, and Horace B. Adams, Owego, N. Y.

126,006.—PROCESS FOR OBTAINING VEGETABLE FIBERS.—William Adamson, Philadelphia, Pa.

126,007.—STEAM-TRAP.—John G. Baker, Philadelphia, Pa.

126,008.—WHIP-SOCKET.—Sylvester W. Beach, Ypsilanti, Mich.

126,009.—ATTACHMENT TO THE BACKS OF SEATS.—Henry M Beidler, Philadelphia, Pa.

126,010.—APPARATUS FOR FORCING LIQUORS.—John F. Bennett Pittsburg, Pa. Ante-dated April 13, 1872.

126,011.—COMPOSITION FOR FILLING FIRE-PROOF SAFES, VAULTS, ETC.—Charles Berger, assignor to himself, Charles L. Ortman, and John Nerreter, East Saginaw, and Sigmund Rothschild and Arnold Kalchen, Detroit, Mich.

126,012.—MOLDER'S FLASK.—Josiah Allen Blake, Providence R. I.

126,013.—WRENCH.—Horace G. Brown, Collinsville, Conn.

126,014.—WEATHER-STRIP.—Michael E. Brown and Eben Brownell, Scranton, Pa.

126,015.—MOLD FOR CASTING PLOW-POINTS.—Henry J. Brunner, Nazareth, Pa.

126,016.—IRON TABLE.—John R. Cazier, North East, Pa.

126,017.—PRINTER'S CASE-STAND.—Robert Chapman, Dublin, Ireland, assignor to Henry Chapman, Philadelphia, Pa.

126,018.—APPARATUS FOR MOLDING CIGARS.—John Charter, Sterling, Ill.

126,019.—SASH-PULLEY CASE.—Charles B Clark, Buffalo, N. Y.

126,020.—METALLIC FIRE-PROOF SHUTTER.—James B. Clark, Ypsilanti, Mich.

126,021.—COUPLING FOR TUMBLING-SHAFTS.—William Click, Clarke County, Ohio. Ante-dated April 12, 1872.

126,022.—FLY-BRUSH.—Wesley M. Cline, Lillard's Mills, Tenn.

126,023.—RELIEF-VALVE FOR STEAM-ENGINE CYLINDERS.—Richard Colburn, Norwich, Conn.

126,024.—GAS-CARBURETER.—George W. Coleman, Kalamazoo, Mich.

126,025.—LAMP.—Abel Combs, Burlingame, Kan.

126,026.—ROOFING COMPOSITION.—David G. Conger, Chicago Ill.

126,027.—INSULATOR FOR TELEGRAPH WIRES.—Joseph I. Conklin, Jun., New York City.

126,028.—COMBINED STOVE-HEARTH AND ASH-PIT.—Charles Cook, Mount Vernon, Ind.

126,029.—DUMPING-CAR.—David S. Cook, Wrightsville, Pa.

126,030.—WASHING MACHINE.—William Cooper, Ypsilanti, Mich.

126,031.—SASH-BALANCE.—John J. Cowell, Newark, N. J.

126,032.—HEDGE-TRIMMER.—Joseph S. Crum, Scottville, Ill.

126,033.—SAWING MACHINE.—Jacob D. Culver, Bellmore, Ind.

126,034.—ORE-CRUSHER.—James W. Cumings, Georgetown, Col. Ter. Ante-dated April 10, 1872.

126,035.—RAILWAY RAIL-SPLICE.—Augustus B. Davis, Philadelphia, Pa.

126,036.—DUMPING-CAR.—John Disterdick, Kelly's Mills, Ohio.

126,037.—COFFEE-ROASTER.—George W. Dodson, Mitchell, Ind.

126,038.—FASTENING TELEGRAPH-WIRES TO INSULATORS.—Dennis Doren, New York City.

126,039.—GOVERNOR FOR STEAM-ENGINES.—James B. Duff, Patchogue, N. Y.

126,040.—BRICK KILN.—John Eisele, Ann Arbor, Mich.

126,041.—MACHINE FOR GRINDING WOOD-PULP FOR PAPER, ETC.—Josiah S. Elliott, Chelsea, and John F. Wood, Everett, Mass.

126,042.—COMPOSITION STONE FRAME FOR HOT-AIR REGISTERS.—Josiah S. Elliott, Chelsea, and John F. Wood, Everett, Mass.

126,043.—STOOL FOR CASTING PIPES.—Charles J. Ellis, Louisville, Ky.

126,044.—FEED APPARATUS FOR SAW-MILLS.—Philip Etches and James D. Wilson, Muskegon, Mich.

126,045.—WASHING MACHINE.—Stephen G. Eubank, Girard, Ill.

126,046.—ROTARY PUMP.—George S. Follensbee, Philadelphia, Pa.

126,047.—BOX FOR STEAMING BARREL-HOOPS.—James L. Gage, Rochester, N. Y., assignor to James Tomlinson and Harriett M. Gage. Ante-dated April 11, 1872.

126,048.—PRINTING-TELEGRAPH.—Robert H. Gallaher, New York City.

126,049.—MATERIAL FOR FILLING SAFES, ETC.—Hermann C. Hahn, Wyandotte, assignor to himself, Sigmund Rothschild, and Arnold Kaichen, Detroit, and Charles L. Ortmann, East Saginaw, Mich.

126,050.—CORDER FOR SEWING-MACHINES.—Henry M. Hall, New York City.

126,051.—METHOD OF CONNECTING PITMEN.—Thomas Hall, Northampton, Mass.

126,052.—CHURN.—John D. Harrison, Middletown, Ohio, assignor of one-half his right to Middletown Agricultural Works. Ante-dated April 2, 1872.

126,053.—PAPER-FILE.—Samuel E. Harrison, Jersey City, N. J.

126,054.—PEDESTAL FOR STREET-RAILWAY CARS.—Daniel R. Hart, St. Louis, Mo.

126,055.—BEE-HIVE.—Samuel O. Higgason, Union City, Tenn.

126,056.—SEWING-MACHINE.—Charles W. Howard, Philadelphia, Pa.

126,057.—SEWING-MACHINE.—Charles W. Howard, Philadelphia, Pa.

126,058.—CARTRIDGE.—William W. Hubbell, Philadelphia, Pa.

126,059.—FOLDING-CHAIR.—Charles A. Jackson, assignor to himself and Kilborn Whitman, Boston, Mass.

126,060.—FURNACE-GRATE.—Charles Kugler, assignor to John W. Stanton and Henry Kerstine, Barnesville, Ohio.

126,061.—MASON'S HOD-IRON.—Laban W. Lake, Providence, R. I.

126,062.—CLOTHES-DRIER.—Chauncey H. L'Amoureux, New York City.

126,063.—BRICK-MOLD SANDING-MACHINE.—Robert Lent, Glasco, N. Y. Ante-dated April 20, 1872.

126,064.—WATER-ELEVATOR.—Noah H. Lindley, Bridgeport, Conn.

126,065.—STEAM-PRESSURE REGULATOR.—Nathaniel C. Locke, Salem, Mass.

126,066.—SPRING AND OSCILLATING AXLE FOR CHILDREN'S CARRIAGES.—James Loughbridge, Pittsburg, Pa.

126,067.—CORN-SHELLER.—Thomas J. Mayall, Boston, Mass.

126,068.—MACHINE FOR SAWING STONE.—James Maydwell, Memphis, Tenn.

126,069.—MANUFACTURE OF FLEXIBLE RUBBER HOSE.—Charles McBurney, Boston, Mass.

126,070.—Suspended.

126,071.—SOLDERING-TOOL.—Louis McMurray and Robert J. Hollingsworth, Baltimore, Md.; said Hollingsworth assigns his right to Francis Cutting, San Francisco, Cal.

126,072.—MILL-PICK.—Charles McNeal, Silver Creek, N. Y.

126,073.—CAR-SPRING.—Allen Middleton, Philadelphia, Pa.

126,074.—PERMUTATION LOCK.—Samuel Miller, Gratis, Ohio.

126,075.—LAMP.—Thomas H. Mott, New York City.

126,076.—LIFTING-JACK.—David Mulligan and John C. Imlay, Greensburg, Ind.

126,077.—PLOW.—Talemachus Nabers, Elyton, Ala.

126,078.—FARRIER'S CLINCHING-TOOL.—Sidney Ogden, Sicily, Ohio.

126,079.—CORSET.—Solomon Ottenheimer, New York City.

126,080.—HARNESS SADDLE-TREE.—Clinton J. Paine, assignor to himself and Henry Creswell, Young America, Ill.

126,081.—SPRING BED-BOTTOM.—Edward Parker, Plymouth, Conn.

126,082.—RAILWAY-FROG.—Denison C. Pierce, Chicago, Ill. Ante-dated April 10, 1872.

126,083.—STEAM-PUMP.—William Porter, Brooklyn, N. Y.

126,084.—LAMP-CHIMNEY CLEANER.—Henry W. Prouty, Boston, Mass.

126,085.—RAILWAY-CAR WHEEL.—Fowler M. Ray, Jun., New York, executor of the estate of Fowler M. Ray, Sen., deceased, assignor, by mesne assignments, to James A. Woodbury, Boston, Mass.

126,086.—ROTARY MOTOR.—William Reading, Georgetown, D. C.

126,087.—BERRY-BOX.—Charles Reese, Baltimore, Md.

126,088.—SOFA-BEDSTEAD.—Herrman H. Reichert, New York City.

126,089.—SPINDLE OR VERTICAL SHAFT.—George Richardson, Lowell, Mass.

126,090.—COMBINED CLOTHES-WHISK AND HAT-BRUSH.—Archibald M. Richmond, New York City.

126,091.—ADJUSTABLE DUPLEX MIRROR.—George S. Roberts, Meredith Village, N. H.

126,092.—WHEEL-CULTIVATOR.—Samuel Rockafellow, assignor to himself, Heman A. Barnard, and J. Silas Leas, Moline, Ill.

126,093.—SWINGING-SAW.—Erastus W. Roff, Newark, N. J.

126,094.—COMPOUND IMPLEMENT.—Charles W. Russell, Milford, Mass.

126,095.—SASH-HOLDER.—John E. Scott, Baltimore, Md.

126,096.—ELASTIC WHEEL FOR RAILWAY-CARS.—Josiah J. Sherman, Albany, N. Y.

126,097.—BRONZING MACHINE.—Charles Shoop, Buffalo, N. Y.

126,098.—RETORT FOR THE MANUFACTURE OF GAS FROM HYDROCARBONS.—Byron Sloper, New York City, and Robert M. Potter, Jersey City, N. J.

126,099.—GLASS-MOLD.—Carl Stadelmann, Pittsburg, Pa.

126,100.—DEVICE FOR LINING CEMENT PIPES.—Melvin Stephens, Brooklyn, N. Y.

126,101.—FLOUR MILL.—Robert M. Thomas, Brady, Pa.

126,102.—LAWN-MOWER.—George William Tischer, Dayton, Ohio.

126,103.—SIRUPING DEVICE FOR BOTTLING MACHINES.—William Tollast, New York City.

126,104.—COMBINED KEY-HOLE GUARD AND BOLT-FASTENER FOR LOCKS.—Charles H. Townsend and Abiather F. Potter, Oakland, Cal.

126,105.—LEATHER BOARDING AND GRAINING MACHINE.—Louis Townsend, Terre Haute, Ind.

126,106.—ICE-ELEVATOR.—Louis Townsend, Terre Haute, Ind.

126,107.—ICE-FLOAT.—Louis Townsend, Terre Haute, Ind.

126,108.—ICE-CARRIER.—Louis Townsend, Terre Haute, Ind.

126,109.—ICE-INCREASER.—Louis Townsend, Terre Haute, Ind.

126,110.—SPRING-CLIP LOCK-NUT.—E. Malcolm Turner, Allegheny, Pa.

126,111.—DRILLING MACHINE.—Anthony Van Haagen and Claus Van Haagen, Philadelphia, Pa.

126,112.—FLOWER-POT.—Ferdinand C. A. Von Levetzow, Kiel, Prussia.

126,113.—BILLIARD-CUSHION.—John Wagner, Detroit, Mich.

126,114.—COOKING-UTENSIL.—Frederic Pelham Warren, East Court Cosham, Great Britain, assignor to George E. Waring, Jun., and J. N. A. Griswold, Newport, R. I.

126,115.—VEGETABLE-CUTTER.—John R. Weed and Adolph Faber Du Faur, New York City.

126,116.—VEGETABLE-CUTTER.—John R. Weed and Adolph Faber Du Faur, New York City.

126,117.—THRASHING MACHINE.—Andrew Wemple, Chicago, Ill.

126,118.—FERTILIZER-DISTRIBUTER.—Wilbur F. White, Belchertown, Mass.

126,119.—LOOM-SHUTTLE.—Robert Whitehill, New York City. Ante-dated April 18, 1872.

126,120.—BORING-TOOL.—Arthur F. Whitin, Whitinsville, Mass.

126,121.—COMPOSITION FOR RENDERING SAFES, VAULTS, ETC., FIREPROOF.—John F. Wood, Everett, Mass.

126,122.—CAR-COUPLING.—Betsey Ann Worden, Scranton, Pa.

126,123.—ARITHMETICAL SUM-SETTER.—Amos W. Price, Detroit, Mich.

126,124.—MEDICAL COMPOUND OR SALVES FOR RING-BONE, SPAVIN, ETC.—Charles Shute, Philadelphia, Pa.

126,125.—STEAM WASHING MACHINE.—Daniel C. Kellam, Pontiac, Mich.

126,126.—PEDDLER'S WAGON.—John Treffelson, Pittston, Pa.

126,127.—RAILWAY-TIE.—Archibald B. Tripler, Philadelphia, Pa.

RE-ISSUES.

4,876.—MACHINE FOR MAKING TIN CANS.—Christian Barry, Philadelphia, Pa. Patent No. 71,680, dated Dec. 3, 1867; re-issue No. 3,143, dated Oct. 6, 1868.

4,877.—AXLE-BOX FOR VEHICLE-WHEELS.—David Dalzell, South Egremont, Mass. Patent No. 106,469, dated Aug. 16, 1870; re-issue No. 4,594, dated Oct. 17, 1871.

4,878.—DOOR-KNOB, ETC.—Edwin Day, Rockford, Ill. Patent No. 85,799, dated Jan. 12, 1869.

4,879.—STEAM AND AIR BRAKE.—John W. Gardner, Cleveland, Ohio. Patent No. 122,884, dated Jan. 23, 1872.

4,880.—CAR-AXLE LUBRICATOR.—John S. Sanson, assignor of part interest to Charles Mettam, Morrisania, N. Y. Patent No. 122,495, dated Jan. 2, 1872.

4,881.—PROCESS OF PRODUCING REFINED WOOD-PULP FOR THE MANUFACTURE OF PAPER, ETC.—Henry Voelter, Heidenheim, Germany, assignor to Albereto Pagenstecher, New York City. Patent No. 55,631, dated May 22, 1866.

4,882.—HYDRAULIC AND PNEUMATIC MOTOR FOR SEWING-MACHINES.—James H. Welch and Rosia W. Welch, Georgetown, D. C. Patent No. 121,441, dated Nov. 28, 1871.

DESIGNS.

5,807.—STOVE-DOOR.—Richard A. Cutter, Peoria, Ill.

5,808.—SHEET-METAL CAN.—Horace Everett, Philadelphia, Pa.

5,809.—ORNAMENTING THE WRISTBANDS OF GLOVES.—Fortuné Hegle, New York City.

5,810.—FLAT-IRON HEATER.—Matthew Little, assignor to Amanda M. Starker, East Saginaw, Mich.

5,811.—GAS-HEATER.—Thomas J. Mayall, Boston, Mass.

5,812.—TIN PAIL.—George D. Napheys, assignor to George C. Napheys & Son, Philadelphia, Pa.

5,813.—DOOR-BOLT.—Adolph Wunder, assignor to Sargent & Co., New Haven, Conn.

5,814 and 5,815.—TYPE.—David Wolfe Bruce, New York City.

5,816.—TYPE.—Julius Herriet, assignor to David Wolfe Bruce, New York City.

5,817.—LAMP-CHIMNEY.—Marion J. Wellman, New York City.

5,818.—CHANDELIER-HOOK.—Joseph B. Sargent, New Haven, Conn.

TRADE-MARKS.

776.—INDIGO SOAP.—H. C. Borgner, Lebanon, Pa.

777.—FILES.—W. Butcher and S. Butcher, Sheffield, England, and New York City.

778.—FILES, EDGE-TOOLS, RAZORS, ETC.—W. Butcher and S. Butcher, Sheffield, England, and New York City.

779.—LINIMENT.—Cloud, Akin & Company, Evansville, Ind.

780.—CLOTHING, SHIRTS, ETC.—Devlin & Co., New York City.

781.—RYE AND BOURBON WHISKIES.—T. and J. W. Gaff & Co., Aurora, Ind.

782.—BOOTS AND SHOES.—Calvin B. Gay, agent, Syracuse, N. Y.

783.—RUBBER GOODS.—National Rubber Co., Bristol, R. I.

784.—FLOUR.—A. Nones & Co., New York City.

785.—CONDENSED LYE.—Jacob H. Seibert, Philadelphia, Pa.

786.—AGRICULTURAL FORK.—Franklin P. Shumway, Leominster, Mass.

787.—REFRIGERATING APPARATUS.—De Witt C. & George F. Taylor, New York City.

788.—MOWING, REAPING, AND HARVESTING TOOLS.—The Greenwoods Scythe Company, Hartford, Conn.

789.—TONIC OR CREAM BEER.—Charles L. Thompson, Baltimore, Md.

EXTENSIONS.

19,966.—WATCH-CASE.—Elihu Bliss. April 13, 1858; re-issued to said Bliss, assignor to Baldwin & Co., Nov. 23, 1858; No. 628.

20,100.—DRAWER FOR CLOSETS, BUREAUS, ETC.—Henry R. Taylor. April 27, 1858.

Letter Box

L. G., OF PA.—To investigate fully the subject of coal-mine explosions would require months of time and the study of scores of volumes. As your invention is, on its face, a good thing, we would advise you to attend to its practical introduction at once, instead of "elaborating" the subject in a book.

M. R. S., OF IND.—We know of no wheelbarrow in the market made with a steel frame, and imagine that the greater cost of such would render them inferior to wooden ones. A slender claim might be obtained on your method of combining wrought and cast metal in the frame. Of its utility and marketability you are doubtless the best judge.

E. W., OF MO.—Ores containing sulphur, arsenic, antimony, zinc, etc., should not be roasted before treatment with quicksilver, to extract the precious metal. The roasting of the ore volatilizes the mineral named, and prevents that coating of the gold particles which with raw ones possessing these impurities prevents the action of the mercury.

G. W. C., OF N. Y.—The composition of hydraulic limes and cements varies very considerably. The common English or Roman cement contains 55·40 per cent. of lime and 44·60 per cent. of clay. French cement, 54 per cent. of lime and 46 of clay; and Russian, 62 per cent. of lime and 38 of clay.

R. R., OF N. J.—Iridosmin fuses at a temperature estimated at ten thousand degrees Fahrenheit. It has been melted by a current of voltaic electricity from sixty large Bunsen cells. Grains of the mineral were placed in a groove made in a block of charcoal, each end of which was connected with a large platinum wire.

ENGLISH PATENT JOURNAL.

LIST OF APPLICATIONS FOR PATENTS ON WHICH Provisional Protections HAVE BEEN OBTAINED IN ENGLAND BY OR FOR AMERICAN INVENTORS.

855.—MACHINE FOR ATTACHING COVERS TO PAMPHLETS.—Andrews, Clagne & Randall, Rochester, N. Y.—March 21, 1872.

857.—OVENS.—G. E. Bailey, Mansfield; C. B. Goodrich, Charlestown; and J. A. Locke, Watertown, Mass.—March 21, 1872.

869.—MECHANICAL MOVEMENTS.—Hendryx & Webster, Ansonia, Conn.—March 22, 1872.

871.—LOOMS FOR WEAVING.—J. Shinn, Philadelphia, Pa.—March 22, 1872.

875.—CONVERTING RECIPROCATING INTO ROTARY MOTION.—R. McC. Fryer, Nashville, Tenn.—March 22, 1872.

877.—MANUFACTURE OF ARTIFICIAL STONE.—E. L. Ransome, San Francisco, Cal.—March 22, 1872.

881.—COMBINATION LOCKS.—T. J. Sullivan, Albany, N. Y.—March 22, 1872.

950.—MANUFACTURE OF HORSESHOE NAILS.—T. H. Fuller, Boston, Mass.—March 30, 1872.

960.—FIRE-PROOF ROOFING.—J. B. Cornell, New York City.—April 1, 1872.

961.—PREPARING WOOL, ETC., FOR SPINNING.—Chase & Platt, Dudley, Mass.—April 1, 1872.

902.—ELEVATING APPARATUS.—A. M. Patrick, Long Lane, Mo.—March 25, 1872.

903.—STEAM RAILWAY-CARRIAGES, ETC.—E. Lamm, New Orleans, La.—March 25, 1872.

909.—COMPOSITION BEARINGS, ETC.—Croll, Barrett & Plush, Philadelphia, Pa.—March 25, 1872.

914.—ICE-CREAM FREEZERS.—J. Tingley, Philadelphia, Pa.—March 26, 1872.

933.—PNEUMATIC APPARATUS.—G. Westinghouse, Jr.—March 28, 1872.

956.—MANUFACTURE OF TAPESTRY AND BRUSSELS CARPETS, ETC.—G. Crompton, Worcester, Mass.—April 1, 1872.

968.—PAPER-RAG ENGINES.—Taylor & Brightman, Cleveland, Ohio.—April 2, 1872.

973.—TREATMENT OF HAIR BRISTLES AND FEATHERS.—Wm. Adamson, Philadelphia, Pa.—April 3, 1872.

974.—PROPELLING VESSELS, ETC.—C. Henye, Hoboken, N. J.—April 3, 1872.

979.—COMPOUND FOR CLEANING CARPETS, ETC.—L. Stern, Boston, Mass.—April 3, 1872.

996.—MACHINE FOR SEWING BOOTS AND SHOES.—C. Goodyear, New Rochelle, N. Y.—April 4, 1872.

977.—GAS-BURNER.—S. Raynor, New York City.—April 3, 1872.

1,016.—SEWING-MACHINE TREADLES.—S. K. Herrick, Boston Mass.—April 5, 1872.

1,019.—THEODOLITES.—U. F. Biggs, Oakland, Md.—April 5 1872.

1,035.—MACHINERY FOR SPINNING WOOL, ETC.—T. Nutting, Rhode Island.—April 8, 1872.

A Deep Bore-hole.

ONE of the deepest, if not the very deepest, bore-hole which was ever sunk is twenty-four miles south of Berlin, near the village of Sperenberg, where a small hill, composed of gypsum, crops out in the diluvial plane of Brandenburg. The presence of gypsum so near the capital caused the Prussian mining authorities to search there for rock-salt; and in 1867 a bore-hole of 15½ inch diameter was begun at that place in the gypsum rock itself. This rock was sunk through for 273½ feet, when antrydrite or antrydric sulphate of lime was met with, which, however, after a depth of only 5 feet, gave place to rock-salt, which was struck quite pure at 284 feet depth from the surface. The bore-hole was continued, and at the end of 1868 it had reached 956 feet, and had still an inner diameter of 12½ inches, after three sets of iron tubes had been inserted. Since the beginning of 1869 boring commenced with steam power, and by the end of that year the bore-hole was sunk to 2,527 feet, by the end of 1870 to 3,479 feet, and in 1871 it was stopped at a depth of not less than 4,052 feet Rhenish, or 4,170 feet English, from the surface, which is the greatest depth that has ever yet been reached. When boring ceased, the chisel stood still in solid rock-salt, so that the salt deposit which was discovered there had the enormous thickness of over 3,768 feet Rhenish. Boring would have been continued in order to explore the underlying rock, but the mechanical difficulties at that enormous depth became too great. In order, however, to further the interests of science, careful observations of the temperature at various depths continue to be made, and will be made public in due time. It is anticipated that the ratio of increasing temperature, as hitherto generally adopted, will be proved to be not very far from truth.

Rolling Logs.

THE Maine loggers are all out of the woods. The operations of the past winter were more extensive than ever before known. The total product of the State, as near as can be estimated, of the cut of logs, is 700,000,000 of feet. Of this amount the Kennebec lumbermen have cut 110,000,000 men, the largest ever cut. The Penobscot lumbermen have cut at least 225,000,000 feet. Most of the timber product is spruce. An intelligent lumberman says that within five years the supply of pine will be exhausted. In the operations of the past winter at the head waters of the Kennebec there were cut some 20,000,000 feet of pine, while the Penobscot lumbermen cut some thirty to forty millions of feet.—*Syracuse Journal.*

AN enterprising Englishman has leased a water lot in Pilatka, Fla., for ten years, with the design of putting up a moss and paper factory. The moss will be manipulated into hair-cloth, etc. The paper-mill is intended to manufacture paper out of the common saw palmetto. Paper made out of this material is now used by the Bank of England for bank-notes.

Foote & Randall's Printing Telegraph.

THE advantages of a telegraph transmitting apparatus which can be operated by any person of average intelligence, after a few minutes' instruction, is sufficiently obvious without further comment. Every man can thus be his own telegraph operator, and railroad conductors, locomotive-runners, clerks, or office-boys can quickly become expert in the use of the instrument.

Our engraving—taken, with the accompanying description, from the *Railroad Gazette*—represents a very simple instrument of this kind, which has been designed by Messrs. Foote & Randall, of New York City.

The receiving apparatus is entirely automatic in its action. A train of wheels and weight is employed to *drive* a type-wheel, which is controlled by a simple and positive escapement. The escapement is controlled by electrical impulses, either from a local or a line battery. There are thirty characters upon the type-wheel, and thirty teeth upon the escape-wheels. A pin upon a lever acts upon the teeth of said escape-wheels in such a manner that the type-wheel is allowed to rotate with a step-by-step motion when the said lever moves to and fro.

This lever has attached to it an armature (a piece of soft iron) which is suspended between two electro-magnets, and the to-and-fro movement of the lever is effected by the attraction of the armature to first one and then the other electro-magnets, alternately, as impulses of electricity are passed over them. Therefore, an impulse over either magnet moves the lever one way, and, the type-wheels turning, a letter is presented to the paper upon which the impressions are made.

As impulses may be sent very rapidly over a wire, and as the lever has but a slight movement, the speed at which the type-wheel revolves is very great, and the printing is effected about as rapidly as one can touch the keys of the transmitting instrument.

The printing is effected with a local battery.

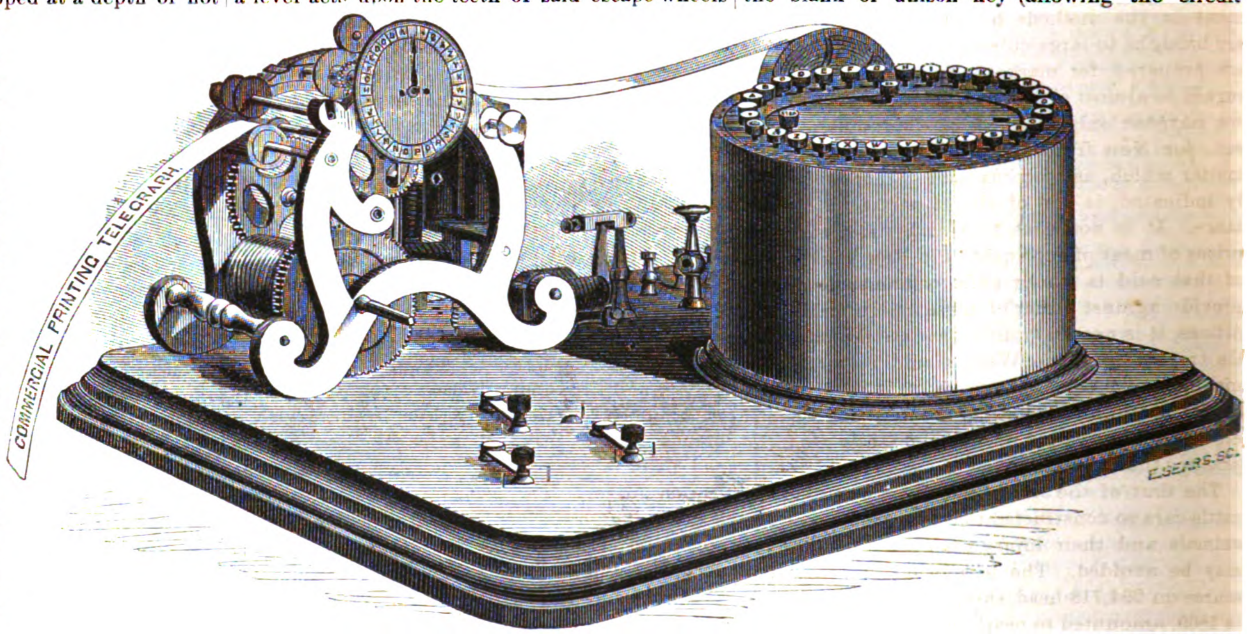
A very complete and important part of this instrument is its unison mechanism which is automatic in its action, and by which the sending operator may instantly set all the instruments in unison (at a given point) at will, thereby positively controlling all the instruments in the circuit, and by its use may be positive that all messages sent correspond with the copy before him (which will have been printed while sending), and received correctly and automatically by the receiving instruments at the station or stations to which it was sent, thereby dispensing with a receiving operator or the constant attention of any one to receive the despatches.

In the transmitting apparatus, as in the receiving apparatus, a train of wheels is employed; but in this case they simply drive or turn the circuit-wheels.

The speed and regularity with which the circuit-wheels move is governed by a centrifugal frictional governor, which is a very simple and complete arrangement; by it the speed may be varied from 10 to 100 revolutions per minute, and, at whatever speed it may be set, it is regular and steady—an essential point in an automatic transmitter.

From the circuit-wheels impulses are made and broken over a line, an impulse being sent for every character upon the type-wheel, and starting from the blank or unison key (allowing the circuit-wheels to turn); by simply depressing the lettered keys, the letter upon the key depressed is instantly printed at the receiving station or stations, and any one of average intelligence can operate correctly after a few minutes' instruction.

The Commercial Printing Telegraph Company, Nos. 75 and 77 Spring Street, corner of Crosby, New York, will give any further information that may be desired concerning this instrument.



FOOTE & RANDALL'S PRINTING TELEGRAPH.

Missouri Iron and English Capital.

THE iron regions of Southeastern Missouri are attracting the attention of English capitalists connected with the iron trade. They will erect two large blast-furnaces and a large rolling-mill at Cape Girardeau this year, on the Mississippi, fifty miles south of St. Louis. The immense iron deposits of hematite ore in Butler and Stoddard Counties can be put down at the Cape on the Mississippi at a very low figure. Coal can also be placed there at from $3 to 4 per tun. These advantages are readily accepted by Englishmen who are familiar with the business, and they will invest largely and build up a great iron manufacturing city at Cape Girardeau.

AMERICAN ARTISAN

BROWN, COOMBS & CO., Publishers.

ISSUED WEEKLY AT

No. 189 Broadway, New York.

S. T. BROWN. J. W. COOMBS.

AGENTS.

AMERICAN NEWS COMPANY ....New York City
NEW YORK NEWS COMPANY .... do
NEW ENGLAND NEWS COMPANY ....Boston.
A. WINCH & Co..............................Philadelphia.
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WEDNESDAY, MAY 1, 1872

THE FOOD SUPPLY OF LARGE CITIES.

THERE is abundant opportunity for improvement in the methods by which articles of food are brought to large cities, and by which the same are prepared for market. This holds true with regard to almost every kind, but in this connection we purpose only to speak of the supply of beef, etc., for New York and other Eastern markets, a matter which, as concerns the city more specifically indicated, is one of almost paramount importance. It is notorious that, aside from the high prices of meat of good quality in New York, much of that sold is wholly unfit for human food. To provide against either of these objectionable conditions, it is necessary, first, that the means of cattle transit from the West should be materially modified, and, second, that the mode of disposing of the cattle and preparing the meat for consumers should be varied in many respects from the practice that now obtains.

The first of the two requisites may be found in cattle-cars so constructed that the bruising of the animals and their injury from thirst and hunger may be avoided. The loss in weight from this source on 294,718 head, shipped east from Chicago in 1869, amounted to nearly fifteen thousand tuns. This, moreover, was the smallest portion of the waste; for the flesh of cattle deteriorated by harsh treatment has less of nutriment and more of the possible sources of disease than is commonly supposed. Several, perhaps a half dozen, plans of car construction have been designed to obviate this; but none appear to meet the approval of railway managers, whose opinion is, of course, the controlling power as concerns the adoption of improvements. These cars are, furthermore, characterized by some authorities, the Chicago *Railway Review* among them, as simply means "at an extra expense of bruising cattle and causing shrinkage in beef." If this be true, there is no need of it; for, to say that inventors cannot provide a cattle-car the use of which will be free from such results, is arrant nonsense.

But the presence, in every part of New York City, of small slaughter-houses, is at once a source of waste, of evasion of the legal provisions against the vending of bad food, and of danger to the health of the community. The remedy is simply in the establishment of large abattoirs, under strict inspection, and so designed and managed as to facilitate the adoption of the most improved appliances known in the industry; for, the more complete this last, the greater the profit to the dealer, and the lower the price at which he can afford to sell. Much economy may indeed be reasonably looked for from this source. Some years ago, a Cincinnati firm effected a material saving in labor by the substitution of a buzz saw for the ax and cleaver in cutting meat, and like results can be obtained in many other departments of the business if it be once concentrated within limits where steam-power and other aids can be availed of. Another source of economy would also be found in the more thorough utilization of waste; as, for example, in the production of albumen and the manufacture of fertilizers from materials that now, from the scattered and small establishments, will not pay for gathering up.

RAPID TRANSIT IN NEW YORK CITY.

UNLESS executive vetoes shall interfere, there will be fair prospect ere long of rapid transit between the upper and lower portions of Manhattan Island. Not only has the State Legislature passed the Vanderbilt bill providing for an underground railway for cars propelled by locomotives, but also an act authorizing the Beach underground line. The Assembly has also passed a bill, now awaiting the action of the Senate, authorizing the Gilbert elevated way. The latter is simply a system of pneumatic tubes sustained on iron arches, and furnished with suitable means of ingress and egress at stations where the cars are stopped. The power to be used in the Beach underground railway is to be determined at some future time by the board of commissioners under whose direction the work is to be carried on. The passenger tube is to have a transverse section not more than eighteen feet in height and thirty-one in width. The proposed route is from the Battery or Bowling Green, under Broadway, to Madison Square; thence under Broadway to its junction with Central Park and Eighth Avenue, with a branch railway passing under Madison Square and Madison Avenue to the northerly shore of the Harlem River. The company is also authorized to connect with Harlem Railroad at or above Forty-second Street, and with the Hudson River line above Fifty-ninth Streets. The necessary stations and tracks of railways for shunting trains may be built.

PROTECTING IRON SURFACES FROM RUST.

RED-LEAD paint is, perhaps, the best coating that can be applied to iron exposed to the weather, while for small castings used in machinery, either in-doors or out, there is probably no better preservative than coal-tar, applied by heating the metal, and plunging it into the previously melted material. But it is manifest that neither of these can meet the exigencies of many constantly occurring cases; such, for example, as those furnished both by the internal and external surfaces of iron ships, water-tanks, and the like. The subject has, of late years, assumed unwonted importance from the multiplication of iron vessels, in which the action of bilge-water and of sea-water are alike sources of continual loss and inconvenience. For the protection of the interior surfaces of such, it has been plausibly suggested that the use of zinc, as in Davy's well-known method, would be effective, there being, of course, no danger of the attachment of sea-weed or barnacles to the inner metallic surface, as occurs when the same means are applied to that in contact with the sea-water. Cements, such as Portland, have also been proposed; but it is doubtful if this, under the strain exerted upon the vessel in rough weather, could either be kept sufficiently free from cracks, or firm enough in its place, to prevent the infiltration of water through it, and the separation of the cement layer from the metallic surface. Concerning this, the opinion of the *Engineer*, expressed some time since, that such a coating to prove impervious to bilge-water must be more or less elastic, is undoubtedly correct. In the production of a substance appropriate to this purpose, much more difficulty will be experienced than one would at first suppose; for the utility of such a material must, of course, depend upon its chemical composition. Experiments must be founded upon deductions from chemical formulæ, and these are frequently woefully disappointing when brought to the test of practice. But under those conditions which will insure freedom from mechanical displacement, a lining of Portland cement is an obviously useful means of preventing corrosion from causes analogous to that above specified. As to the external protection of iron ships, we must perforce leave it where we find it, a problem that has baffled the ablest scientists and the most unwearied experimenters, and which may only be solved by the discovery of materials or methods of application not yet known in the arts.

COOLING AND VENTILATING RAILWAY CARS.

THE ventilation and cooling of railway cars during our hot summer days is a matter of quite as much importance as the warming of them in winter. Little has been done to provide these desiderata in any appreciable degree, and the welfare of the travelling public requires that attention should be called to the subject until reform is inaugurated. Claiming as we do to be the most inventive people in the world, and the foremost in the rapidity of railway extension, it is by no means to the credit of our projectors and engineers that schemes of at least apparent utility should be brought out and applied abroad before the adoption of anything of a practical character on American railroads. Perhaps from these, notably from one now in use in the East Indies, some hints may be gathered from which schemes appropriate to the railways of this country may be evolved.

In the apparatus referred to, an air-chamber is provided under the floor of the car, and has valves at either end, to be opened, one or the other, according as the car is moving in one direction or another. Above the chamber is a peculiar cellular structure, kept moist from a reservoir carried on the car, and through which the air is caused to circulate on its passage from the chamber to the car interior. This provides for the cooling of the air and the cleansing of the same from dust, and also for its admission to the car by the forward motion thereof. To provide for the exit of warm or vitiated air, the windows are made to open horizontally, so as to be placed at an angle to the side of the car, the position being capable of reversal according to the direction of the movement of the car. The speed of the train causes the air in front of the inclined window surface to deflect it in a current which, as will be easily comprehended, draws out the air from the car by means of the partial vacuum created behind such window. With a car constructed on the principle thus roughly sketched, there is a reduction of temperature of about fifteen degrees, with an evaporation of six gallons of water per hour in the cooling devices. In one instance, under peculiar conditions, and with an excessive evaporation, the diminution of heat amounted to thirty degrees. Of course, the item of expense may be assumed as consider-

able, and this may stand in the way of the adoption of the plan on ordinary cars, but should not be allowed to do so as concerns the palace cars, upon which so much is lavished even in many things of far less consequence than that to which we have here briefly called attention.

MEETING OF THE MASTER-MECHANICS.

IT is officially announced that the Annual Meeting of the American Railroad Master-Mechanics' Association will be held in the city of Boston, on the 11th day of June next. The proceedings of this organization are full of interest, and result in bringing a vast amount of new and practical information before the engineering public, and it is to be hoped that the coming yearly gathering will secure a full attendance.

Small Arms for the Government.

THE general belief that the Springfield or Allen breech-loading rifle will soon be abandoned by the War Department for a better arm causes great activity among the inventors and manufacturers of other breech-loaders, a number of whom are here pressing their guns upon the attention of the military committees of both Houses of Congress. The Springfield gun was never formally adopted as the regulation arm of the service. It is a combination of the patented devices of various inventors made by Mr. Allen, the master-mechanic of the Springfield Armory. It is the favorite of the Ordnance Bureau, which has managed to keep it in service since 1866, under pretense of experiments, to the exclusion of other guns which have the preference of most of the leading officers, including Gen. Sherman. In the summer of 1870 a board was assembled at St. Louis, under the presidency of Gen. Schofield, to test all breech-loaders presented, and report which ought to be adopted. This board gave the preference to the Remington gun, but named five others as also good weapons. These were the Springfield, the Ward-Burton, the Sharpe, the Henry Martini, and the Morgan Stern. The War Department, about a year ago, selected the Remington, Ward-Burton, and Sharpe, and manufactured several hundred of each at the Springfield Armory, and put them in the hands of the troops for a practical test in actual service in comparison with the Springfield gun. Monthly reports of these tests have been received, and it is understood that another board will shortly be convened to examine the reports, and make a final selection of an arm to be adopted as the regulation United States breech-loader. It appears to be generally admitted that the Springfield gun will be rejected, as it would doubless have been long ago were it not for the partiality of the Ordnance Office, and one object the parties interested in other guns have now in view is to secure legislation restraining the Chief of Ordnance from spending the next annual appropriation for the manufacture of arms in making this, which they assert is an inferior weapon. Gen. Roberts, the inventor of a gun bearing his name, is also endeavoring to secure a further competitive trial by the troops to which the gun shall be admitted, and to obtain compensation for the use by the Government in the Springfield arm of several of his patented devices—among others, of the tapered chamber and cartridge. On Saturday the Military Committee of the House witnessed a trial of the Remington, Ward-Burton, Roberts, and Springfield guns at the Armory in this city. A number of Congressmen, officers, and inventors were present. The trial of rapid firing resulted as follows:—Shots per minute—Ward-Burton, 23; Remington, 22; Roberts, 17; Springfield, 10. There was also a trial to show the time in which the breech-loading mechanism of each gun could be taken to pieces after firing a shot, the parts reassembled and replaced, and another shot fired. In this experiment the Ward-Burton came out ahead. Time, 3 seconds.—*New York Tribune.*

Southern Manufacturing Facilities.

SUCH is the mildness of the Southern climate that factories require no artificial heat to produce a temperature suitable for spinning yarn smoothly and evenly, and consequently for the manufacture of evenly woven cloth. This is a very great consideration. The humidity of the climate is also another valuable condition. Furthermore, operatives enjoy much better health here than in any Northern State. Scientific and medical authorities urge, as a reason for this, that while at Lowell at least seven months in the year they require artificial heat conveyed through the entire mill in order to produce a given temperature, nature supplies that temperature here. In Lowell, they do not only have the doors and windows closed to exclude the air, but put listing in the interstices as a further exclusion. The result is that operatives inhale an impure atmosphere. Here, the greatest enemy to the health is the midday sun. The operatives live around the factory, and are protected from the sun while at work. During ten months of the year the factory windows and doors are all thrown wide open, and the operatives have a comparatively cool place to work in. In the North, factory operatives, as a class, are pale, attenuated people. Here they are healthier than any other class of laborers. An operative here can buy a house and lot for a comparatively trifling sum, and they, the workers, manage to do it, or they rent houses for a mere song, with an acre or half an acre of ground, and raise vegetables for home use with less than half the attention necessary in the North.

The best proof of what we have said is furnished in the fact that the Augusta or Columbus manufactories can ship their products to Lowell and undersell the Lowell people, and while doing that they will make and the Lowell people will lose money. If enterprising Northern cotton manufacturers would come here and examine into the operation, they would be convinced that there is money in it, and no trifling sum either. It would be much better for the whole country if some Northern capitalists would develop this industry here, because, while it would be a matter of profit to them, it would benefit the whole people, and soon do away with all pretence of a necessity for a protective tariff on manufactures of cotton. No cotton factory that I have yet seen in the South makes a profit of less than twenty per cent. per annum on the capital invested in buildings and stock. Every yard of goods or pound of yarn they produce finds ready sale, and the makers themselves are the men of all others who are most anxious for Northern capitalists to come among them and build factories and mills right alongside of theirs. True, there may be a little selfishness even in that, because every new mill lessens the individual expense of controlling the water-power; but the disposition proves that there is abundant room, raw material, work, and labor for all the capital and energy our millionaires may see fit to invest here, and profitable demand for all the cotton and woolen goods they may manufacture.—*Cor. of The Plantation.*

Cotton-seed Oil and Oil-cake.

THE manufacture of oil from cotton-seed is becoming an important branch of the productions of the United States. The first mills were erected shortly before our late civil war, and the oil, as well as the oil-cake, have yearly increased in public favor. There are at present upwards of twenty mills exclusively operated in this business, working over one hundred and fifty thousand tuns annually of cotton-seed. Of these mills New Orleans numbers six; Memphis, Tenn., four; Vicksburg, Miss., two; Nashville, Tenn., two; Mobile, Ala., one; Selma, Ala., one; and the others at points on the Mississippi we cannot now call to mind. The aggregate capital of the New Orleans mills is $1,500,000.

The cotton-seed oil, after being refined, is largely shipped to Bordeaux, Barcelona, and other olive-growing districts in Europe, and, after receiving a certain "doctoring," is shipped to this and other countries as "pure olive oil." Cincinnati, Ohio, demands large quantities of the cotton-seed oil, where it is refined and bottled for table use, for which it is well adapted, being brilliant and having a fine flavor. England is also beginning to appreciate the oil, having during the last year ordered quite largely.

The "oil-cake," or, in other words, the cotton-seed after the oil is pressed from it, is largely shipped to England, where it is used as food for cattle. On our own Southern plantations the raw seed is preferred for cattle. Before the seed is pressed the hulls are taken from it, and the milkmen of New Orleans purchase these hulls as a desirable food for milch cows. Although it is eaten with avidity by the cows, it is quite doubtful if any great benefit is derived from it. The use of these hulls as a dressing is claimed to be very beneficial to the growth of the sugar-cane.

We notice that a number of our cotemporaries have spoken of cotton-seed oil as being chiefly used in the manufacture of soap. This is more imaginary than real, as it is only the waste from the refining vats that is thus used.

In this connection we may state that another oil-producing crop is making strong claims to the attention of the agriculturist. We refer to the Russian sunflower, grown in that country to the extent of from thirty to forty million pounds annually, the oil from which is wholesaled in St. Petersburg at about twenty cents gold per gallon. The climate and soil of our Western States are said to be largely and peculiarly adapted to this plant, and that it can be grown as cheaply and yield as largely as corn, with double the value as an oil-producing seed.—*Newark Manufacturers' Gazette.*

NEW YORK OMNIBUSES.—There is only one stage now in New York City where ten years ago there were at least five. This decline is a sign of improvement; for the clumsy, lumbering vehicle is as much behind the time as a canal-coat. An omnibus is almost the only material thing in this country superior to the law of progress. The New York-stages, which have been withdrawn from different lines, have been sold to other cities and towns, and may be found in nearly every part of the Union rendering anti-dyspeptic service to their passengers.—*Exchange.*

SEWING-MACHINE schools for indigent children are the latest invention of the charitable associations, and a very practical and sensible and popular innovation it is proving.

The Sewing-machine Trade.

DURING the past twenty years, the business of making and selling sewing-machines has grown from small and insignificant beginnings, beset with difficulties and opposition of every kind, into one of the flourishing and remunerative branches of trade. Although the first patent issued to Howe was dated as far back as 1846, this new industry made no appreciable progress until about 1852, and even then its promoters were laughed at as seekers after the impossible, and decried as men trying to take the bread out of the mouths of poor seamstresses, who depended upon the needle as their sole support. Gradually, however, prejudice gave way, improvements were constantly made in the machine, rendering them better adapted for all kinds of sewing, and now, instead of the 1,500 or 2,000 machines which were with great difficulty disposed of in a year's time at that early period, the aggregate yearly sales of all the so-called "regular" companies, some five or six in number, foot up the surprising total of 600,000 machines annually, the total yearly sales amounting to between twenty and thirty million dollars.

Of actual mechanics directly employed in making sewing-machines, irrespective of those whose livelihood is gained in producing the materials which enter into their structure, there are at least ten thousand, whose wages, at a low estimate, amount to $25,000 per day, or *seven and one-half millions* yearly. And these are but a portion of the men employed. All of the large companies have in each city well located and expensive warerooms, where a number of clerks, salesmen, girls, to give instruction in the use of the machines, and others find work, besides a host of canvassers and agents, whose name is legion, who receive liberal commissions, and to whose importunities, perhaps, this important industry is largely indebted for its unprecedentedly rapid growth.

There is probable no business in which the cost of selling bears so large a proportion to the original cost of the article as in this. The ordinary manufacturer sells to "second hands," who support their own establishments. But in this business the large companies are, as we have said, the proprietors of expensive stores in all the large cities, which are maintained at great expense. The rent-roll of one of these companies, as returned monthly to the head office, foots up over $200,000 annually, and the competition between different makers has caused advertising to become a most important item, from $75,000 to $100,000 being spent annually in this manner by each of the leading makers.

In this, as in many other mechanical contrivances, American ingenuity completely outstrips that of our friends across the water. One or two of the largest manufacturers have extensive works in England, where they can, of course, manufacture much cheaper than here, and compete to advantage with machines of English make, the superior quality of the work done by American machines being readily acknowledged. In France, too, our machines are well-known; and in an otherwise, to us, unintelligible copy of a newspaper published in an interior city in Spain, we recently saw the advertisement of an agency there, in which the well-known names of prominent American makers were conspicuously displayed.

Opinions differ as to the prospective demand for sewing-machines. The more cautious incline to the belief that at the present rate of production every family in this country, that can afford one, will soon be supplied; and that within the next three or four years the demand will fall off materially. Others again, more hopeful, and relying upon the demand from new sources, as well as that made by the rejection of old machines for others of later and improved construction, claim that the business is still capable of large development, and confidently look forward to the time when a round million of machines will be produced annually. Although perhaps somewhat extravagant, the latter view is probably nearer correct than the former, especially when we consider how wide a field for disposing of these useful machines is opening in foreign lands, and when it is remembered that the expiration of the principal and essential patents, which will be within the coming six years, will throw the business open to general competition and necessarily reduce the price of the best machines to a figure which will place them within reach of all.—*Com. Bulletin.*

The Heating of Railway Carriages.

THE means hitherto in use for this purpose have found only a limited application, owing chiefly to the trouble of working them and the expense they involve. In a pamphlet recently written by Mr. C. Rieches, of Hanover, treating of this subject, he enumerates the following modes: —1. Heating by stoves. 2. Heating by cases or vessels—(*a*) filled with hot water; (*b*) filled with sand; (*c*) filled with glowing charcoal; (*d*) acted on by a spirit flame. 3. Heating by steam. 4. Heating by heated air.

The first plan, heating by stoves, though it makes the train independent of stoppage at stations for heating purposes, is open to the objection that much space is taken up, and the heat is unequally distributed. For spacious compartments arranged for a comparatively small number of passengers stoves are suitable, and on some of the East Prussian railways they have been used with success. The fuel is supplied from above, and without incommoding the passengers, and the heating effect is regulated by the admission of air, by an apparatus under the control of the officials. The stoves require frequent attention, however, and in a long train this becomes burdensome. In the special kind of stove just referred to it is necessary to use charcoal, as any other fuel would be apt to cause extinction of the fire.

Heating by vessels or cases filled with water or sand is of frequent use. The sand absorbs a much larger quantity of heat than the water, and gives it out more slowly. The cases are sometimes placed under the seats, sometimes between them; in the latter case, they are either placed loose under the feet or thrust into hollow spaces made to receive them. Sand is preferable for cases placed under the seat, and water for the others. This method is, however, also expensive and troublesome. Heating apparatus is required at the stations, and if all the carriages are to be supplied, there must either be long delays in exchanging the cold for hot vessels, or a large staff of men must be employed to do the thing quickly. Where sand is used, it is renewed every four hours; water must be renewed much more frequently.

Another mode is that of filling cases with an artificial fuel, which, in Kienast's method, consists of pulverized charcoal, nitric acid, and starch. At first this was put in iron cases 628 mm. long, 105 mm. broad, and 65 mm. high, which were perforated in the sides. This was found, however, to be productive of headaches, and the fuel was, therefore, put into closed cases, which were pushed from the outside under the seats. The fuel, as used, was made up in half-pound pieces, 105 mm. long, 80 mm. broad, and 60 mm. thick. In an experiment on the line between Aix and Berlin, eight pieces were used, in four cases, for the heating of one compartment. After a sixteen hours' journey, the pieces of charcoal were still glowing, and a thorough heating of the compartment had taken place. The cost of a hundredweight of the fuel is 10 thalers (30*s.*), and the heating now referred to cost 10½ *sgr.*, or about 1*s.*

A further method is that in which the heating is produced by a spirit flame. The apparatus consists of a long flat case with perforated sides, and a top of wire gauze. A spirit-lamp of peculiar shape is suspended in the interior, in such a way that no harm can come of the case being turned on either of its axes. The flame is surrounded with wire gauze, and between the top of it and the cover is a steatite plate. Cross-bars are placed above the case, and there are bags placed over these for receiving the feet. The oil-supply lasts fifty hours, and the cost is very small.

We come next to the heating by steam, a method developed in various forms by Haag, in Augsburg, and which has many advantages. The heating effect can be controlled during the journey from one point in the train; and it can be readily applied to an entire train, while, with suitable arrangement of the pipes, the heat is equally distributed, and no additional apparatus is required at the stations. The pipes may be variously arranged; a main pipe may be placed along the entire length of the train, with other pipes branching off into the compartments, or the pipe conducting the steam may be used directly for heating the carriages. In the former case, there is the objection of presenting a larger amount of condensation surface, while it has the advantage that it is possible to shut off the supply of steam from single compartments. It is always of importance so to lay the pipes that they may be filled only with steam. It is inconvenient to use steam at a high tension, on account of the necessity in such a case of having strong and accurately fitting joints between the carriages. Two atmospheres may be regarded as the limit. The steam may be brought either from the locomotive boiler or from a boiler specially constructed for the purpose. In the latter case, there is the taking up of space to be considered, and the increase of about 20 cwt. dead-weight. In a long journey a fresh supply of fuel and water must be taken in, and the apparatus requires a special attendant. These objections fall away when the steam is taken from the locomotive boiler, and allowed a certain expansion before admission into the pipes. Where a separate vessel is employed, the supply of steam is soon used, and it becomes difficult to preserve the normal tension; and, on the other hand, steam taken from the locomotive boiler diminishes the working power. In recent experiments made with reference to this on a railway in Lower Schleswig, the steam was taken from the locomotive, and it was found that a very small quantity of additional fuel was adequate to produce the required supply. The question of cost was decided in favor of the plan adopted.

Finally, in the use of heated air, the casing of the stove is formed of some badly conducting material. The cold air enters the stove by openings in the lower part, gets warmed, and rises to the roof of the carriage. By this means a slow circulation is produced, and the temperature is equalized more than in the method first specified. This plan is adopted on many of the Hanover railways. In some cases the heated air is conveyed by pipes from the stove to the ends of the carriage.

Fish-oil Colors.

VARIOUS coarse paints, applicable to out-door work, and of great cheapness and durability, may be made with fish-oil, according to the following processes:—

To Prepare the Oil.—Into a cask which will contain about forty gallons, put thirty-two gallons of good common vinegar; add to this twelve pounds of litharge, and twelve pounds of white copperas in paper; bung up the vessel, and shake and roll it well twice a-day for a week, when it will be fit to put it into a tun of whale, cod, or seal-oil (but the Southern whale-oil is to be preferred, on account of its good color and little or no smell); shake and mix all together, when it may settle until the next day; then pour off the clear, which will be about seven-eighths of the whole. To clear this part, add twelve gallons of linseed-oil, and two gallons of spirit of turpentine; shake them well together, and, after the whole has settled two or three days, it will be fit to grind white-lead and all fine colors in; and, when ground, cannot be distinguished from those ground in linseed-oil, unless by the superiority of color.

If the oil be wanted only for coarse purposes, the linseed-oil and oil of turpentine may be added at the same time that the prepared vinegar is put in; and, after being well shaken up, is fit for immediate use, without being suffered to settle.

The residue or bottom, when settled by the addition of half its quantity of fresh lime-water, forms an excellent oil for mixing with all the coarse paints for preserving outside work.

All colors ground in the above oil, and used for inside work, must be thinned with linseed oil and oil of turpentine.

Preparation of Particular Colors.—Subdued Green.—Fresh lime-water, 6 gallons; road dirt, finely sifted, 112 pounds; whiting, 112 pounds; blue-black, 30 pounds; wet blue, 20 pounds; residue of the oil, 3 gallons; yellow ochre in powder, 24 pounds.

This composition will weigh three hundred and sixty-eight pounds, which is a little more than two and a half cents per pound. To render the above paint fit for use, to every eight pounds add one quart of the incorporated oil, and one quart of linseed-oil, and it will be found a paint with every requisite quality, as well of beauty as of durability and cheapness, and in this state of preparation does not cost five cents per pound.

The following is the mode of mixing the ingredients:—

First pour six gallons of lime-water into a large tub, then throw in one hundred and twelve pounds of whiting; stir it round well with a stirrer, let it settle for about an hour, and stir it again. The painter may then put in the one hundred and twelve pounds of road dirt, mix it well, and add the blue-black, after which the yellow ochre; and when all is tolerably blended, take it out of the tub, and put it on a large board or platform, and, with a laborer's shovel, mix and work it about as they do mortar. Now add the wet blue, which must be previously ground in the incorporated oil (as it will not grind or mix with any other oil.) When this is added to the mass, you may begin to thin it with the incorporated oil, in the proportion of one quart to every eight pounds, and then the linseed-oil in the same proportion, and it is ready to be put into casks for use.

Lead Color.—Whiting, 112 pounds; blue-black, 5 pounds; lead ground in oil, 28 pounds; road dirt, 53 pounds; lime-water, 5 gallons; residue of he oil, $2\frac{1}{4}$ gallons; weighs 256 pounds.

To the above add two gallons of the incorporated oil, and two gallons of linseed-oil to thin it for use, and it will not exceed two cents and a quarter.

The lime-water, whiting, road dirt, and blue-black must be first mixed together; then add the ground lead, first blending it with two gallons and a half of the prepared fish-oil; after which, thin the whole with the two gallons of linseed oil and two gallons of incorporated oil, and it will be fit for use. For garden doors and other work liable to be in constant use, a little spirits of turpentine may be added to the paint whilst laying on, which will have the desired effect.—*Painter, Gilder, and Varnisher's Companion.*

First American Card Leather Manufacture.

MR. PLINY EARLE, of Leicester, Mass., was the first in the manufacture of machine card cloths in America, which he commenced in 1786. His first customer was Samuel Slater, of Providence, R. I., the pioneer of the cotton manufacturing industry of this country, who had then just returned from England with draughts for the construction of cotton machinery, which could not be obtained from England, as the British Government was then so mean and narrow-souled that its exportation was strictly prohibited to any of its colonies.

Mr. Slater, immediately on his return to Rhode Island, commenced the development of his plans, but found great difficulty in procuring machine card cloths. Learning, however, that Pliny Earle was engaged in the manufacture of hand cards at Leicester, he visited him there, and explained what he wished to accomplish.

Mr. Earle at once procured some calf skins, from which he prepared a few sheets, measuring 4 by 24 inches. With no other machinery than two needles, he made the holes for the teeth and set them in the cards with his fingers. Subsequently he arranged machinery with which he accomplished the work much more speedily. He made the teeth with one machine and punched the holes in the leather to receive them with another. Then he sent them about the town to be put in with the dextrous fingers of the skillful citizens. It was not long, however, before Yankee genius combined the two machines, thereby securing for New England the honor of producing the first card-setting machine that the world ever saw; and it is a remarkable and noteworthy fact that this machine has not been improved, in any particular, since it was perfected forty years ago, by William B. Earle, son of Pliny, although many attempts in that direction have since been made. At the outset the yearly product of card-cloths amounted to only a few hundred dollars, although the price per square foot was five times more than now.—*Shoe and Leather Reporter.*

Wrought-iron Ties.

WROUGHT-IRON ties, in use on several Belgian railways, are said to give great satisfaction. The rails laid are $4\frac{7}{8}$ inches deep, with $2\frac{3}{4}$ inches head and $4\frac{1}{8}$ inches base, with fish-joints, and secured by $4\frac{3}{4}$ inch bolts. The ties are simply rolled I-beams, 8 feet 5 inches long, placed 8 feet between centers. Between these and the rails are interposed oak blocks, 10 inches long and $6\frac{1}{4}$ by $2\frac{1}{2}$ inches in the cross section; the rails, blocks, and ties are securely held together by the bolts. This plan is said to have many advantages, the durability of the ties being of course the more prominent. At any rate, it commends itself to the consideration of those whose objection to them are their want of elasticity peculiar to wood. We have heretofore spoken of this experience, and await with interest the results of the only satisfactory test in such matters, viz., a thorough trial.—*Railway Review.*

Different Kinds of Engraving.

"LINE" engraving is of the highest order. All great engravings are done in "line"—simply straight lines. Next comes "line" and "stipple." "Stipple" means dots—small dots like this:.... These small dots are used to lighten up the high parts of the face or drapery. It is very hard to engrave a face in lines, simply, and only master engravers have ever undertaken it. The masters understand and practice both "line" and "stipple." Claude Mellan engraved, in 1700, a full head of Christ with one unbroken line. This line commenced at the apex of the nose, and wound out and out like a watch-spring, until it ended in the border of the picture. Mezzotint engravings are produced thus:—The steel or copper is made rough like fine sand-paper. To produce soft effects this rough surface is scraped off. If you want a white place or "high light" in your engraving, scrape the surface smooth, then the ink will not touch it. If you want faint color, scrape off a little. Such engravings look like lithographs. Etching is adapted to homely and familiar sketches. Almost all the great painters were etchers. Etching is done thus:—The copper or steel plate is heated and covered with black varnish, and the artist operates with sharp needles, working on the surface as he would on paper with a pencil. Nitric acid is then poured over the plate, and it eats away at the steel and copper wherever the needle has scraped off the varnish. When the varnish is removed with spirits of turpentine, the engraving is seen in sunken lines on the plate.—*Printer's Circular.*

Another Atlantic Cable from Lisbon to Brazil.

A CONVENTION has been signed between the Maintenance and Construction Company of Great Britain and the Government of Portugal, for the laying of a telegraphic cable from Lisbon, by way of the Madeira and Cape Verde Islands, to Brazil. This is a great undertaking; but the company indicated is a strong one, and will doubtless carry the enterprise expeditiously through. Between Lisbon and the nearest point on the coast of Brazil, Cape St. Roque, by the route designated, the distance is some three thousand five hundred miles, in a southwesterly direction. For the first two thousand miles, by the Madeira, Canary, and Cape Verde Islands, the line, a few hundred miles distant, will run parallel with the west coast of Africa. The Cape Verde Islands are within two days by steam from the British settlement of Sierra Leone and our neighboring African Republic of Liberia. From Sierra Leone, across the Atlantic to Cape St. Roque in Brazil, the distance is nearly the same as from the most southerly of the Cape Verde Islands, about fifteen hundred miles. But on the route between these islands and Cape St. Roque are, first, the little island of St. Paul, and then, within two hundred miles of said cape, is the little island of Fernando Noronha: so that, from these convenient stations *en route*, no single stretch of the cable between Lisbon and Brazil exceeding eight hundred miles will be required.

NEW AMERICAN PATENTS.

WE give, as follows, notices of some of the most interesting inventions for which Letters-Patent of the United States have recently been issued:—

ROD SOLDER.—F. Deming, Waterbury, Conn.—*April* 16.—This method of manufacturing solder-bars consists in casting the solder into a block of suitable form, chucking or securing said block in a turning-lathe, and turning it down by a hollow cutting-tool moved laterally along the block in the usual manner of turning, and thus produce a continuous round shaving or rod of solder.

BEER COOLER.—R. Dreher, Milwaukee, Wis.—*April* 16.—The most noticeable feature of this invention is found in the construction of a beer cooler in two sections, with projections, upon which the beer falls upon the inside, one section hung by a pin or hinges so that it may be turned down to be cleaned.

DEVICE FOR CHANGING SPEED IN MACHINERY.—W. Heckert, Newcastle, Pa.—*April* 16.—This inventor claims the use of stepped surfaces in a hollow conic frustum, in combination with a wheel which is capable of being adjusted to any one of said surfaces, and also of being rotated by a belt which it has on its shaft. Also, the use of a locking, holding, and pressure pin, in combination with the frame of the shaft, the wheel, and the conic frustum.

STEERING DEVICE FOR CANAL-BOATS.—E. McCreery and J. McCreery, Middletown, Pa.—*April* 16.—This improvement comprises two boats or barges fitted together by means of a projecting cut-water fitting into a notch in an overhanging guard, and coupled and steered by means of a chain or rope, having its ends fastened to the forward boat and passing around pulleys and a properly arranged wheel. Also, the combination with the subject-matter of the foregoing clause of a chain-wheel, steering-wheel, pinion, bar, and tube, all combined and arranged for conjoint operation.

SAFETY-PLUG FOR STEAM-BOILERS.—J. R. Robinson, Boston, Mass.—*April* 16; ante-dated *March* 30.—This safety device consists in a plug having a greater area to be acted upon by the pressure within the boiler, to cause it to break, than that of the opening for the escape of the contents of the boiler after the break.

ELECTRICAL SAFE PROTECTOR.—C. C. Rowell and W. Duncan, Lebanon, N. H.—*April* 16.—The gist of this improvement lies in the inclosure of a safe composed of sectional plates provided with air spaces, and connected together by tubes so as to give free air circulation, and combined with an electric circuit and an alarm apparatus.

GAUGE FOR BUTTON-HOLE CUTTERS.—G. Stackpole, Elizabeth, N. J.—*April* 16.—This improved button-hole cutter gauge is composed of a plate which is provided with not only cutting gauge slots of different lengths and properly designated, all of which extend from a common base-line, but is also provided with a graduated scale extending from the base-line of the slots along the edge of the plate, by which the distance between the edge of the garment or fabric being cut and the base-line of the slots can be readily determined.

CENTRIFUGAL MACHINE FOR DRAINING SUGAR.—J. Cottle, Boston, Mass.—*April* 16.—This centrifugal machine has the basket shaft supported upon a bearing-plate suspended from the curb-stand. The foot of the shaft is supported upon a spherical bearing, while the upper part of the shaft is supported in a laterally yielding bearing. Furthermore, the stand is made with corner spaces for receiving the suspending devices.

ORNAMENTAL MIRROR.—W. M. Davis, Brook haven, N. Y.—*April* 16.—This new article of manufacture consists in a mirror formed of a plate of glass, having upon its posterior surface a deposit or coating from salts of silver or platinum, or a mercurial amalgam, said coating removed to form a design or figure, and covered with a contrasting backing.

APPARATUS FOR MOLDING HOLLOW ARTICLES FROM PAPER PULP.—J. L. Kendall, Foxborough, Mass.—*April* 16.—This is an apparatus more particularly designed for manufacturing hats of paper pulp, and comprises a tank having a perforated mold-block located therein, and provided with a water escape-pipe and steam-jet. There is also claimed a skeleton mold-block, having a wire netting in two layers.

VENTILATION FOR WINDOWS.—G. W. Pell, New York City.—*April* 16.—This ventilator consists of two sections formed of sheet-metal or other material, of peculiar cross-section, and furnished with receiving openings at the outside and discharge openings at the top, and telescoped together at one end for lengthening and shortening, and suitably shaped and provided with covers at the other.

LIFE-PRESERVING MATTRESS.—J. Adams, Gloucester, N. J.—*April* 16.—This life-preserving mattress is constituted by the combination of an ordinary bed or sleeping mattress, a bouyant mattress, and transverse straps extending around the two other parts, thus uniting them in one compact bundle, and affording holds for the hands and feet of the occupant.

LIFTING-JACK.—J. S. Bodge, La Porte, Ind.—*April* 16.—This invention is constituted by the combination with a lifting-jack having three legs, and one of the legs used as a lifting lever, of a strap, chair, or its equivalent, to attach to the article to be raised. Also, the combination in suitable relation to each other of the legs, the strap or chain, and a bail and pins.

PORTABLE OIL CAN.—C. J. Hanck, Brooklyn (E. D.), N. Y.—*April* 16.—In this invention, the spout of an oil-can is provided with a curved lip and with a correspondingly curved receiving-tube, used in combination with an oil-can provided with a spring bottom.

HAND PUMP.—T. J. Mayall, Boston, Mass.—*April* 16.—Among the most noticeable features of this improvement is the combination with a cylinder of a hollow piston-rod and nozzle, and a water supply pipe and tube, connected with and discharging into the said piston-rod. Also, in the combination with the said cylinder, hollow piston-rod, and water-supply tube, arranged as previously specified, of a handle attached to and projecting laterally from and at about right angles with the said piston-rod.

STEAM-ENGINE.—A. T. Nichols, Williamsport, Pa.—*April* 16.—This invention embraces two engines for operating the propeller-wheels of a canal-boat, when they have their link-valves connected in such a manner that both engines may be operated in the same time with one lever.

APPARATUS FOR RENDERING AND DRYING ANIMAL MATTERS AND BURNING THE GASES.—M. J. Stein, New York City.—*April* 16.—Among the several distinctive features of this apparatus may be more particularly noted the combination, with a chamber or vessel for carrying on a heating operation, of a furnace and means for conducting the gases and vapors from said chamber to said furnace, an interposed condenser for separating the condensible from the non-condensible portions of the products of distillation, and permitting the passage to the furnace only of the non-condensible products. Also, the combination, with the heating vessel and condenser, of a purifying and filtering device, by means of which the condensed products may be purified and allowed to pass off separately. Also, a device or means to unite currents or jets of air and gas, or jets of different gases, for the purpose of producing combustion, composed essentially of one or more sets of passages, supplied from separate sources, and arranged to cause the separate jets conveyed through them to converge and impinge or come together.

LAMPS.—Thomas H. Mott, New York City.—*April* 23.—This invention, which relates to students' and other lamps, applicable also in part to chandeliers, consists in a longitudinally divided construction of the bracket or brackets which unite the body or supply chamber with the wick tube or burner, in combination with a tube or tubes incased by said bracket or brackets, for conveying the oil or fluid to be burned. This construction reduces the number of joints, and dispenses with much soldering. Such longitudinally divided bracket is also circumferentially divided at its eye or socket in such a manner that the one section of the divided bracket is of a whole or ring construction at such part, to facilitate attachment of the bracket by a side screw or screws to stand or stem without springing the longitudinally divided sections apart. Furthermore, as applied to a desk or table lamp, the construction includes a lug or pin for conversion of the whole into a bracket lamp attachable to a wall or elsewhere. The invention also relates to detachable oil reservoirs made of glass, and operating by inversion to feed the lamp through a valve connected with the cork or stopper of said reservoir, and the improvement in respect to this device consists in a cup-shaped construction of the mouth of the reservoir beyond the cork or stopper when in its place, to catch any surplus oil in filling, also in an air escape through the cork or stopper to facilitate filling with the cork in its place and valve open.

SIRUPING DEVICE.—William Tollast, New York City.—*April* 23.—This invention relates to devices for supplying a measured quantity of sirup into bottles when under the filling head of a bottling-machine, combined with a supply of water charged with carbonic acid gas under pressure, and caused to also pass through the siruping device, whereby the bottle is charged with sirup, and filled with said water in a continuous manner while under the bottling machine to which the siruping device forms an attachment. The invention consists in a novel construction of device or apparatus for the purpose, including a particular combination of details, among which is a screw plunger and system of valves operating in connection therewith, whereby efficiency is combined with simplicity, durability, and compactness.

TAKE-UP DEVICE FOR SHUTTLES.—Robert Whitehill, New York City.—*April* 23.—This invention relates to the shuttles of looms used for weaving corsets and other articles, or work in which the number of wrap-yarns raised and lowered to open and close the shed is varied during the progress of the work, so as to change the width of the shed. The invention consists in a take-up roller, constructed or provided with an eye or guide for the weft-yarn as it comes from the quill to pass through, and so that said take-up, which is an attachment to the shuttle, presents no obstruction to the draught on said yarn, but is operated by frictional contact with the warp to take up and let out yarn, in a uniform manner, the surplus weft-yarn drawn from the quill by the throw of the shuttle over or beyond the width of the shed.

APPLICATIONS FOR EXTENSIONS.

OPPONENTS of extensions must file *written* objections in the Patent Office at least 20 days before the day-of-hearing; and on that day, at noon, they must appear personally, or by proxy, at the Patent Office, and state the reasons of their opposition. All testimony—*pro* or *con*—must be taken and transmitted in accordance with the official rules, which will be furnished on application. The under-named patentees have recently petitioned for extensions (for seven years) of patents granted to them in the year 1858:—

ANN JANE SERGEANT, administratrix of ISAAC A. SERGEANT, deceased, Orange, New Jersey.—*Clothes-wringers.*—Patented July 27, 1858, and reissued June 18 and December 31, 1867; testimony will close on June 25, next; last day for filing arguments and examiner's report, July 5; day-of-hearing, July 10.

PERRY G. GARDNER, New York City.—*Tempering Steel for Car-springs.*—Patented September 28, 1858; testimony will close on August 27, next; last day for filing arguments and examiner's report, September 6; day-of-hearing, September 11.

CHARLES P. STANFORD, San Francisco, Cal.—*Feeding Quartz, etc., to Machines for crushing and grinding the same.*—Patented July 27, 1858; testimony will close on June 25, next; last day for filing arguments and examiner's report, July 5; day-of-hearing, July 10.

WILLIAM WHITNEY, Boston, Mass.—*Electro-magnetic House Alarms.*—Patented July 20, 1858; testimony will close on June 18, next; last day for filing arguments and examiner's report, June 28; day-of-hearing, July 3.

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In making application under the new law of 1870 for a United States Patent for an Invention, the first instalment of the Government fee is $15, which sum—together with fifty cents revenue stamp-tax on the power-of-attorney—*is payable in advance* on applying for the Patent, and $20 additional are due to the Government when the Letters-Patent are allowed. The agency fee charged by Messrs. BROWN, COOMBS & Co. is from $25 upward, according to the labor involved, but in all cases their charges will be as moderate as possible for the preparation of drawings and all necessary documents. This fee is not payable until after the application has been prepared and the case is ready to be sent to Washington, and it includes all necessary services performed by Messrs. BROWN, COOMBS & Co. through their *Branch Office* in Washington, to secure the speedy and certain issue of the Patent.

Patents for Designs can be obtained at a less cost than Patents for Inventions, but these Patents only cover novelty of shape or configuration. They can be obtained for three and a half, seven, or fourteen years. The Government fees are payable in one sum in advance, and are $10 for three and a half years, $15 for seven years, and $30 for fourteen years. Messrs. BROWN, COOMBS & Co.'s agency charges on Design Patents vary from $15 to $25. The Patent Office does not require models for Design Patents.

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Before an Inventor has completed his machine or improvement, he can cause a description of it—accompanied by a drawing, if necessary, and illustrating his invention so far as it is perfected—to be made and deposited in the "secret archives" of the Patent Office as a "caveat," which entitles him to receive notice, during the next year, of any application for patent made by another person on a similar invention, and gives him the opportunity to contest priority of invention with such other person. The Government fee on a caveat, under the new law, is $10, and Messrs. BROWN, COOMBS & Co.'s charge for preparing all necessary papers is from $10 to $15. Caveats can only be filed by citizens of the United States, or foreigners who have resided in this country for one year and made oath of their intention to become citizens.

REJECTED APPLICATIONS, EXTENSIONS, RE-ISSUES, INFRINGEMENTS.

Messrs. BROWN, COOMBS & Co. also give special attention to the prosecution of applications for Patents which have been *rejected* in the hands of other attorneys; also, to the *extension of expiring Letters-Patent*, and to the *re-issue of defective Letters-Patent*, in all of which branches of business they have been eminently successful. They also give opinions on the *infringement* of Patents.

MODELS, SPECIMENS, ETC.

No models are required for design-patents, and in other cases it is left to the discretion of the Commissioner of Patents whether he will require a model; but in order to enable the model to be dispensed with, the drawings require to be very full and plain, and the specification to be prepared with great care and skill, and it will be more than ever necessary that the inventor should employ a thoroughly competent attorney. Messrs. BROWN, COOMBS & Co. will, whenever desired, and if it is possible to do so, obtain the permission of the Commissioner of Patents to dispense with a model. This, in many cases, will save the inventor much trouble and expense in obtaining the patent; but we recommend, as a general rule, that a model should accompany the application. Models, when required, must be neatly and substantially made of hard wood or metal—or if of soft wood must be painted or varnished; they should not exceed one foot in any of their dimensions.

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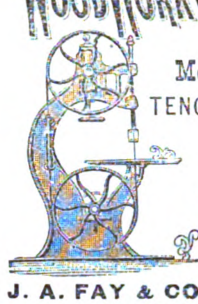

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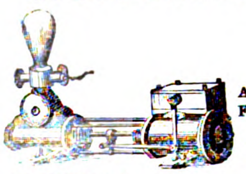

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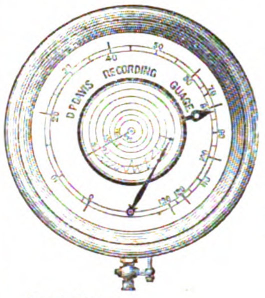

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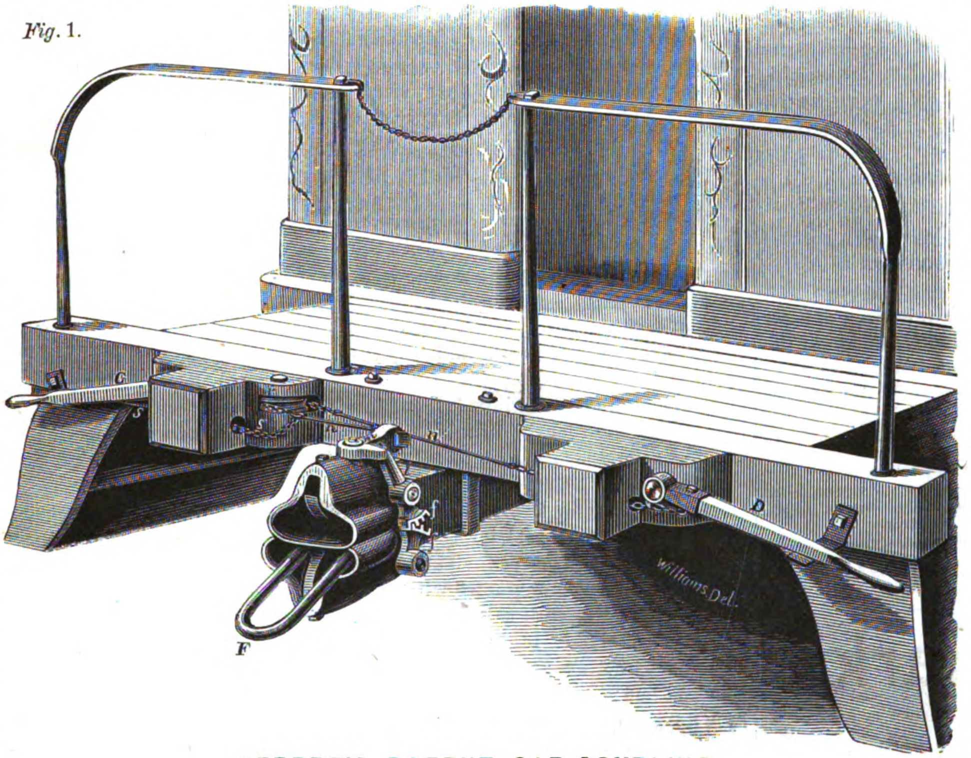
Hebert's Patent Car-coupling.

THAT railroad companies should adopt some better method of coupling cars than that afforded by the common link is denied by few. But among the large number of devices brought forward during the past few years to provide a more efficient coupling, only a very small number have commended themselves to even a limited use. The apparatus represented in the accompanying engraving is designed to avoid the objections hitherto urged against most self-acting couplings, and was patented through "The American Artisan Patent Agency," June 14, 1870, by Alexis Hebert, of Malone, N. Y. Fig. 1 shows in perspective the application of the improved coupling to a car platform, and Fig. 2 is a longitudinal sectional view of the same.

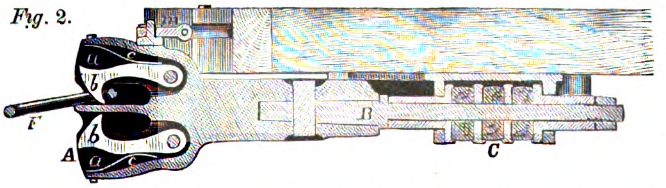
Fig. 1.



HEBERT'S PATENT CAR-COUPLING.

Each double-throated draw-head, A, is capable of a limited longitudinal movement with reference to the platform to which it is affixed, being connected by bar, B, with the buffer spring, C, in the usual or in any suitable manner. Within each throat or chamber, *a*, of the head is a pivoted hook, *b*, the position of which is more fully shown in Fig. 2, each hook being pressed up or down as the case may be toward the central partition of the head, by a spring, *c*. The pivot of each hook projects laterally outside of the head, and upon its external end has a toothed sector, *f*. The two sectors of each head gear into each other, so that a movement given to one will be communicated to the other. The uppermost sector has an arm, *i*, against which bears one arm of an elbow-lever, *m*, pivoted upon the top of the coupling head. From the other arm of this elbow-lever extends a chain, *n*, which, passing around a pulley, *r*, is carried to and connects with the lower end of a lever, D, at one side of the platform, in such wise that by depressing said lever the elbow-lever will actuate the sections to move apart the hooks to release the link, F, held by one or the other as the case may be. There also passes from this chain another chain, *s*, which connects direct to the lower end of a similar lever, G, at the opposite side of the platform, the depression of this lever producing the same result as does that of the other.

Fig. 2.



It is evident that the link, F, may be thrust into one or the other of the throats of the head, according to the height of the platform, lifting the hook in such throat by pressing against its inclined forward end, and then permitting it to fall and hook therein. Both ends of the link being thus held in the heads of two adjoining car platforms, the same are effectually coupled together, the apparatus providing, as will be seen, a self-acting or automatic coupling. In order to disconnect or uncouple the cars, it is only necessary to operate one or the other of the levers at the side of the platform of either car, as previously herein described, to cause the hook holding the link to release the same. This coupling attached to one car may, from its use of link, be readily used in connection when required with a car having the drawhead of the ordinary coupling. For any further information concerning this new coupling, parties may address either the inventor at the address hereinbefore given, or Mr. J. K. Hebert, 437 Broadway, New York City.

THE storm signal-man, on the top of Mount Washington, is said to hold the hightest office in the gift of the nation.

Puddled Steel Rails.

THE Flushing and North Side Railway Company with its leased roads will have laid, by the 1st of July next, 40 miles of steel track. The rails are of 4½ inches high section, weighing 64 lbs. to the yard, and are manufactured at the Funeke & Elbers steel-works in Prussia. They are of puddled steel, with partly iron flanges and vertically piled.

The advantages claimed for these rails are:—1st, perfect safety against breaking, not a single rail of this kind having been broken in the track within twelve years' use in Germany and four years' use in this country. 2d, greater strength and endurance than can be obtained from steel-capped rails. 3d, the rails, which are made of puddled steel and iron welded together, can be reduced in the heating furnace to wrought-iron equal in quality to the best charcoal fine-grained iron, and can be reworked in the ordinary cheap way of re-rolling old rails.

The value of the worn-out puddled-steel rails is therefore higher in proportion to first cost than that of cast-steel rails, or iron rails with cast-steel caps, which cannot be re-rolled, but must be recast in the Martin furnace. Ten thousand tuns of worn-out puddled steel rails would find eager buyers in any part of the world where wrought-iron is manufactured; ten thousand tuns of worn-out cast-steel rails or cast-steel-topped rails would probably not sell so readily, because their consumption by the Bessemer and Martin furnaces is necessarily limited.

The only disadvantage of the puddled-steel rails is that a percentage of them may give out in the weld after a wear about equal to that of the life of one to three common iron rails. This is only a disadvantage in comparison to full steel or ingot rails, which have no welds, and therefore cannot fail in the same manner. Setting aside the greater safety of the welded steel rails, the question of economy in the use of either would then chiefly depend on their respective first cost, on their wearing qualities, and on their market value as scrap when worn out. The solution of this question will depend more or less on the individual experience of the consumers, especially of those who have tried the different kinds of steel rails.—*American Railway Times.*

THE PRESERVATION OF TIMBER.*

BY RICHARD H. BUELL, C.E.

[Continued from page 274.]

HAVING now spoken of the principal methods employed for expelling or drying up the sap, we come naturally to the second branch of the subject, under which head are classed all modes of preservation accomplished by introducing some substance that acts as an antiseptic, or forms an insoluble compound in the pores of the wood. All the metallic salts are known to be antiseptic in their nature, and to act to coagulate the albumen of the wood. In 1792, it was proposed to soak the timber in copperas water. Thomas Wade, in 1815, spoke of the salts of copper, zinc, and iron, and mentioned that boiling timber in green vitriol had been long practiced in Sweden. Sir Humphry Davy, in 1821, recommended corrosive sublimate, afterwards applied by Sir Robert H. Kyan.

It should be stated that the compounds formed by the metallic salts and the antiseptic agents, such as salt, lime, creosote, etc., are not perfect preservatives, in the most rigid application of the term, inasmuch as they are all more liable to decay, on exposure to air and water, than the woody fiber itself; but they are generally spoken of as preservatives, since they combine with the vegetable matter, and form compounds which are not prone to decay. Hence none of the methods to be hereafter described are as perfect in their action as a process by which all the perishable matters are removed from the wood.

Looking over the patents that have been granted to various inventors, we find rather a formidable list of preservative materials, none of them, perhaps, entirely destitute of merit, but the authors of many of them showing little knowledge of the nature of wood or the chemical changes they desired to effect. Below is given a list of the most prominent:—

Sulphate of Copper.	Sulphuric Acid.
" " Lime.	Lime.
" " Alumina.	Nitrate of Potassa.
" " Soda.	Arsenious Acid.
Carbonate of Soda.	Corrosive Sublimate.
" " Potassa.	Oil.
" " Baryta.	Pyrolignite of Iron.
Tar.	Refuse Liquors of Chlorine Works.
Smoke.	Mother Water of Marshes.
Chloride of Sodium.	Metallic Sulphurets, after decomposition by an Acid or a Metallic Salt.
" " Zinc.	
Sulphate of Magnesia.	
" " Baryta.	

I will refer briefly to such of these substances as seem to deserve attention.

The antiseptic properties of common salt are well known, and it has been used in many cases in ships, being put into the spaces between the timber. A number of vessels built in Boston, of unseasoned wood, were treated in this manner, and after a period of fourteen years were found to be in perfectly good condition. Among these was the U. S. brig *Argus*, launched at Boston in 1802. Salt is still employed in many vessels built in the United States. Its preservative action depends upon its power of abstracting water from the wood, and partially dissolving the albumen. A serious objection to the use of salt is the great weight required—twenty-eight tuns of salt being necessary for a three hundred tun ship.

Some instances of the good effects of salt water may be noticed. The English frigate *Resistance* was sunk in Malta harbor, and, being raised after some time, it was found that the dry-rot evident in her timbers when she sank had ceased its ravages. Two English ships, the *Eden* and *Mersey*, were infected with dry-rot, and covered with fungus. The *Eden* was sunk in Plymouth harbor for eighteen months, and at the end of that time it was found that the decay had ceased, while the *Mersey* was almost destroyed.

In regard to the use of lime in connection with ship timber, the experience of an old ship-builder on the coast of Maine, published in the *Mechanics' Magazine*, is of interest. He had been in the habit of filling up the spaces between the timbers with hard stone lime, and ramming it in, calculating that slight leaks would cause the lime to expand and fill all the crevices. Long observation had led him to consider lime a good preservative. A coasting schooner, built of Maine timber, unseasoned, and loaded with lime, had gone ashore and had bilged. Being raised and repaired, the schooner remained sound for thirty years, with the exception of the wood that had been used in making the repairs. It had been noticed, also, that vessels carrying cargoes of lime generally lasted longer than others. But the most striking case was that of a platform of pine planks, used to mix mortar on, that had been employed by father, son, and grandson, and, being no longer needed, was suffered to remain on the ground and became overgrown with grass and weeds. After a period of sixty years, having occasion to use the ground, the planks were removed, and found to be as firm and hard as when first laid down.

There is a very serious objection to the employment of salt, salt water, and lime in the construction of ships, that they cause considerable dampness in the vessel, affecting the health of the crew, and the condition of the cargo, and also increase the tendency of the nails and iron fastenings to rust.

Dr. Boucherie's experiments, conducted in 1838, throw some light on the value of the metallic salts as preservatives. He took one thousand young chestnut and pine stems, which he divided into eleven parcels, and treated as follows:—1st, Left in their natural state; 2d, impregnated with bichlorides of sodium and mercury; 3d, impregnated with salts of iron; 4th, impregnated with salts of copper; 5th, impregnated with salts of zinc; 6th, impregnated with salts of lead; 7th, impregnated with chloride of calcium; 8th, impregnated with chloride of lime; 9th, impregnated with chloride of lime mixed with soluble metallic sulphates; 10th, impregnated with chloride of calcium mixed with certain pyrolignites; 11th, impregnated with pyroligneous acid.

All the sticks were buried in the ground to the depth of one foot, and examined at the end of two and a half years. Those sticks that were unprepared and those impregnated with the salts of lead were worm-eaten, and so much deteriorated that they would crumble with a slight touch; those treated with the salts of iron were considerably decayed, but the remainder were in the same condition as when buried.

A more delicate test was made by Dr. Boucherie with the pulp of beets. Some that was unprepared molded in nine days. The addition of one and a half grains of corrosive sublimate to three and a quarter ounces of the pulp completely protected it, as did also the same quantity of pyrolignite of iron, while, adding as much as twenty-three grains of the sulphates of iron and copper respectively to three and a quarter ounces of the pulp, the decay was only retarded in the first case one day, and in the second, two. Dr. Earle's patent, 1838, was for boiling the wood in solutions of the sulphates of iron and copper, and, as far as I can learn, the results obtained were not very good. Some wooden pavement, prepared by Dr. Earle's method, and laid in Philadelphia, had to be removed in less than two years. This may perhaps be accounted for by supposing that the sulphuric acid set free from the combination attacks the word, and hastens its destruction.

Looking at the most noticeable patents on wood preserving processes, in the order of their issue, we must refer to Mr. Brant's method, in which oil is introduced into the pores of the wood by means of a force-pump, the air having first been exhausted from the vessel in which the wood is placed. This seems to have been attended with some success, but was very little used, and is only mentioned here as being the first case in which the preserving solution was forced into the wood.

In 1832, Sir Robert H. Kyan patented a process for preserving timber by introducing corrosive sublimate in solution into its pores. He had made numerous experiments, however, previous to this date. Those conducted by order of the English Admiralty were probably as decisive as any. In 1828, a twelve-inch cube of kyanized oak, consisting of sap and heart wood, was placed in the fungus pit at Woolwich Dock-yard. This pit is lined with wood in the most advanced stages of decay, and covered with fungus, and the air is so foul that a candle will not burn when lowered a few inches into it. The piece of oak, after remaining in the pit for three years, was found to be unchanged, and was the first stick of wood (according to the testimony of the man in charge) that had ever been removed from the fungus pit in a sound condition. Sir Robert Smirke was one of the first architects to use this prepared timber in the construction of houses, and with excellent results. He also applied severe tests in the course of his experiments; but, in his testimony before the commission on timber duties, he said, "I cannot rot it."

As this process evidently possesses considerable merit, some description of how it is conducted may not be out of place. Originally the wood was merely immersed in the solution, and it was stated that after a few hours a violent ebullition took place, caused by the chemical combination of the corrosive sublimate with the soluble matters of the wood. Be that as it may, this plan was soon abandoned, and that of exhaustion and pressure substituted in its stead. An account of the apparatus for kyanizing the timber for the permanent-way of the Hull and Silby Railway, in England, in 1842, will show the general method of impregnating the timber by exhaustion and pressure. There were two cylindrical tanks, made of half-inch iron, each seventy feet long and six feet in diameter. The heads were strengthened by cast-iron girders, and had sliding-doors, fitted with balance weights, so that they could readily be raised or lowered. The tanks were lined with felt, to protect the iron from the action of the corrosive sublimate. The air-pump had a diameter of fifteen inches and ten inches stroke, and there were two force-pumps, four and six inches in diameter respectively, and with a stroke of two feet, which readily produced a pressure of one hundred pounds per square inch. A mixture of one pound of corrosive sublimate with one gallon of warm water was made in a trough, and this mixture being run into one of the tanks was diluted to the proper degree, which was determined by a hydrometer, or by the act of its

* Paper read before the New York Society of Practical Engineering, April 18, 1872.

turning a piece of silver brown (a very delicate test). The operations of exhaustion and pressure required five hours, and the whole process seven, and the services of eight men. One hundred cubic feet of timber required one and a half pounds of corrosive sublimate, making the cost, including part of the first cost of the apparatus, about twelve cents per cubic foot.

Kyanized timber has been analyzed by Faraday and Berzelius, and it is found that part of the corrosive sublimate forms an insoluble compound with the albumen of the wood, while about three-fourths as much as is in combination remains free, but cannot be removed except by the disintegration of the wood.

The kyanizing process, as described above, was conducted much more economically by means of excellent apparatus and experienced management than is generally the case. Usually a greater quantity of corrosive sublimate than is necessary is introduced into the pores of the wood. This will be set free by heat and moisture, poisoning the atmosphere. It is found also that the corrosive sublimate has a tendency to corrode the nails and other iron-work in structures of kyanized timber. For these reasons in part, but principally on account of the expense involved, Kyan's process has gradually been abandoned. I find one instance of a ship built of kyanized timber throughout, the *Samuel Enderby*, launched at Cowes, in 1834. The preparation was also applied to the sails and cordage of this vessel to prevent mildew. As an example of the use of kyanized timber in this country, it may be mentioned that it was employed in the construction of the aqueduct of the Alexandria Canal over the Potomac River, at Georgetown, D. C.

A patent was granted to Francis Moll, of England, in 1835, for exposing timber to the vapor of *eupion* and creosote in close vessels. Moll's invention seems to have excited little attention, and I have alluded to it chiefly on account of the fact that almost the same process has recently been patented in the United States, by Louis S. Robbins, of this city. I am inclined to think that the practicability of impregnating the timber with a substance introduced in the form of vapor is rather doubtful, at least in the time specified by Mr. Robbins, viz., six hours for large logs of green wood, and three hours for smaller pieces of sawed lumber.

In 1838, Sir William Burnet took out a patent for impregnating wood with a solution of chloride of zinc, by immersion in the mixture from ten to twenty days. Subsequently, the solution was introduced by exhaustion and pressure, as in the case of Brant's and Kyan's preparations. This method was received with some favor, being much cheaper than the kyanizing process, and was introduced into this country in 1856, a company being organized at Lowell, Mass., for the purpose of burnetizing timber. Below is given a list of the prices charged by this company, whose apparatus was very similar to that described in speaking of Kyan's patent:—Spruce lumber, $5 per 1,000 feet; other lumber, $6 per 1,000 feet; shingles, 75 cents per 1,000 feet.

The burnetizing process has been employed on the Philadelphia, Wilmington, and Baltimore Railroad, and also on the Union Pacific Railroad. There is also, I believe, an establishment at Elizabeth, N. J., for treating timber by this method. Some of the burnetized timber seems to last very well, but there have been several instances of speedy decay, a few, in fact, among the buildings of the company at Lowell. It may be that there are some kinds of wood on which this preparation acts beneficially, while failing to protect others. It is to be regretted that those employing the process have not given more publicity to the results obtained from its use.

(*To be concluded.*)

Cast-steel Axles.

WILLIAM THOMSON, of Normanton, and Andrew Macredie, of Sheffield, England, have devised modes of constructing molds for casting double-cranked axles and other irregular forms in steel. These molds are made of metal, and in two or more parts bound together by straps and eccentrics. The molds are tapered to allow the steel to contract towards the centre, and, in the case of molds for double-cranked axles, wedges or removable pieces are inserted between the cores separating the throws, so that by withdrawing these the requisite freedom for contraction is provided. The patentee states that, by employing these molds, and casting the parts shorter and thicker than they are required to be when finished, they are enabled to produce steel castings which can receive any necessary amount of hammering, and which will not require to be cut to shape when forging.

Photo-relief Printing.

THE following account is given by the *Printer's Circular* of the method of picture-making pursued by the Photo-relief Printing Company, of Philadelphia, and which is stated to give results closely resembling those of the usual photographic method:—

"The original preparation of the 'forms' is based on the peculiar qualities of a mixture of gelatine and bichromate of potash, which, after being exposed to the action of light, in the photographic manner, and subsequently soaked in hot water, obtains gradations of thickness corresponding to the lights and shadows of a photograph. Thus is created what might be termed a cast of a picture—thick where the picture is of a dark color, and thin where it is of a light color. This soft film of gelatine and bichromate of potash is then placed upon a piece of hard metal (composed of lead and antimony) of appropriate size, and subjected to very heavy hydraulic pressure. From this operation results a reverse cast of the picture in hard metal, resembling in appearance, and in the character of its inequalities of surface, a medal struck from a coin press. This cast in hard metal then becomes the 'form' of the photo-relief printer, in substantially the same sense that a stereotype or electrotype plate constitutes the form of a typographic printer. The mode of printing, however, differs radically from typographic printing; and while it bears some resemblance to copper plate printing, it still presents some strong contrasts to that method. For convenience, and to avoid a waste of time on the part of the printer, six small presses (each of which is more like the copying-press than any other form of press with which printers are familiar) are placed upon a circular revolving table, and the printer thus prints upon six presses in succession instead of only one. After placing the cast upon the bed of the press, a fluid mixture, composed of gelatine and such coloring matter as may be selected, is dropped upon a point near the centre of the cast. There is no rolling, no even distribution of this 'ink' (if it may be so called) over the surface; and the inking of the form looks like dropping a puddle of writing ink over the form to be worked. The paper is then applied, and the top of the press pulled down over it and left to exert a continuous pressure, until the five casts on the succeeding five presses of the circular table have, in turn, received similar treatment. A brief interval of time having thus elapsed (for the whole process is quite as rapid as work on the hand printing-press), the top of the form is lifted, the paper removed, and a *fac simile* of the original photograph is presented—the philosophy of this operation being that large quantities of gelatine are transferred from the hollows of the cast to certain parts of the printed picture, thus forming the dark shades, while little or no gelatine is transferred to the parts of the picture opposite to the elevations of the cast, which represent the lights. The printing is now complete, and it only remains to remove the superfluous gelatine from the sides of the picture, and to subject them to an alum bath, for the purpose of fixing colors and making it permanent.

New York Ship-yards.

SAYS the New York *Times*:—"Only a few years ago ship-building was a live business here, and the ship-yards, which were situated principally along and on both sides of the East River, presented an animated scene. The ship-joiner's eight-hour strike in 1866 sounded the knell of this branch of mechanics, and now the yards are, for the most part, silent and deserted. Where the leviathan was wont to leap joyfully from the ways into its new element, now floats listlessly a few old hulks under repair—or more probably there is nothing at all to show that ships were ever built there. Ten years ago there were nearly a dozen yards in active operation in this city and on the Brooklyn side of the East River. The principal of these were as follows:—In New York: Mr. Webb's yard, foot of Sixth Street, East River; Jeremiah Simonson, foot of Twelfth Street, East River; Messrs. Joyce & Waterbury, foot of Stanton Street, East River; Jacob A. Westervelt, foot of Third Street, East River; and Thomas Collyer, also on the east side. At Green Point, Long Island, John Englis & Son, Henry Steers, Lawrence & Foulk, and R. C. Pollion, Brooklyn. Of all this list there are none now in operation, except those on the other side of the East River. The yards in New York are, without exception, doing nothing. Mr. Webb launched from his yard the grand Sound steamers *Bristol* and *Providence* during the strike, and subsequently two noble steamships for the Pacific Mail Steamship Company, to run between San Francisco and China. These were the last of Mr. Webb's creation. All the other yards on the New York side ceased operations about the same time. John Englis & Son, Green Point, and R. & C. Pollion, Brooklyn, are doing the principal business now, and, in fact, nearly all that is being done. Within the past twenty-four months there have been launched from the yard of Messrs. Englis & Son, the steam-propellers *City of Mexico*, 1,500 tuns, and *City of Merida*, 2,200 tuns, for the Havana and Vera Cruz trade; *Trinidad* (side-wheel), 1,200 tuns, launched last October, built for the house of Menenzes & Co., Havana, to run on the north side of Cuba; *Falmouth* (side-wheel), 1,450 tuns, launched about two months ago to run between Portland and Halifax, and there are at present on the stocks the propeller *City of Havana*, 2,400 tuns, for the Mexican mail service (will be launched in about two weeks); side-wheel steamer not yet named, just being framed, to run between New York and New Haven. The *City of Havana* is 265 feet over all, and will cost about $300,000. The New Haven boat is 325 feet long, and 80 feet extreme width.

But little is doing at Mr. Steers's yard, the proprietor having become interested in the iron ship-building at Chester, Pa. About three months ago, the Government dredge-boat *Gen. Stewart* was launched at Mr. Steers's yard, and it is the last from there. She is designed for the service in keeping the mouth of the Mississippi River in navigable order. A full description of this vessel was given in the *Times* a few weeks ago. The *Gen. Stewart* will make her engineer's trial-trip next week.

The Messrs. Pollion have at present on the stocks a propeller, 188 feet long, 28 feet beam, and 17 feet hold, for the Japanese Government. It will not be ready to launch before the fall. Also, a small propeller, 125 feet long by 23 feet beam and 10 feet hold, for the same Government; and the center-board yacht *Viking*, 84 feet long, 23 beam, and 8 feet hold, for Mahlon Sands.

Messrs. Pollion have also, within a few weeks past, launched two ferry-boats for the Astoria and Williamsburg Companies. The yachts *Dreadnaught*, *Dallas*, *Agnes*, the elevator barge *Scotia*, and the telegraph tug-boat *William Orton*, have also been turned out from their yard within the past eighteen months or two years.

This completes the catalogue, showing what the ship-yards are and have been doing. The material used is all brought from a distance; nothing except a little chestnut timber is obtained within 100 miles of this city. The live-oak is brought from Florida; the white-oak from Ohio and Michigan, by way of the lakes, Erie Canal, and the Hudson River. Locust, tamarack (called at the yards hackmatack), yellow pine, and red cedar are also used in constructing the vessels, and are brought from a distance.

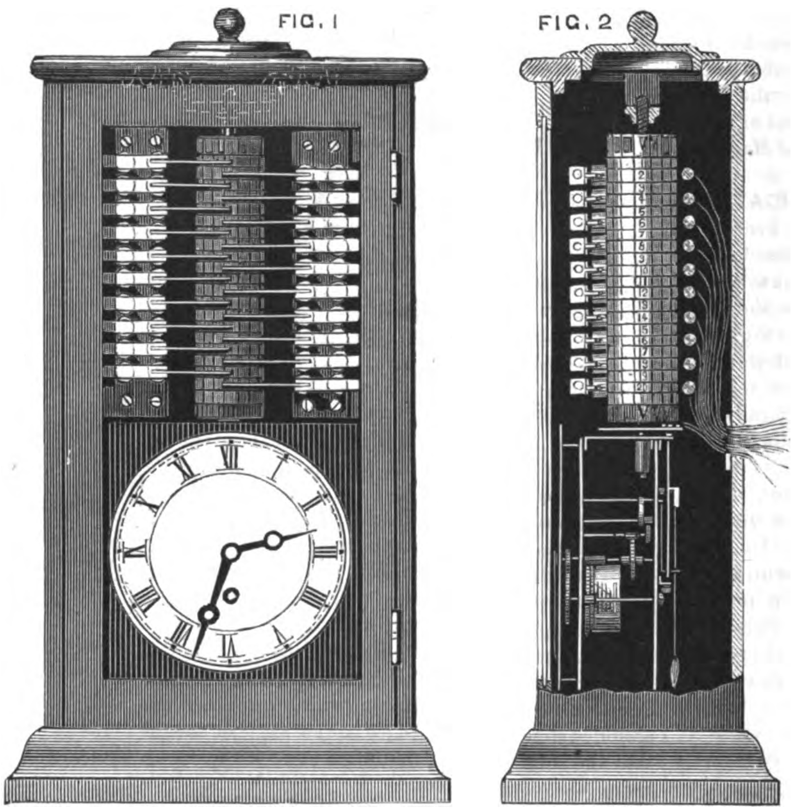
The ship-builders say there is no prospect of a revival of ship-building here until Congress gives merchants an encouragement to build ships in the way of subsidies. They have been waiting for something of this kind for the past three years, and in the meantime put their money into something that pays them better than ships. The ship-builders say with reference to the free-ship policy, that it would entirely kill ship-building here, and then when war came the Government would have no mechanics to build and repair its navy.

The Steamship "Old Dominion."

THE new iron steamship built for the Old Dominion Steam Company was open for inspection April 25, at the company's pier foot of Beach Street, and was visited by a large number of ladies and gentlemen. Her magnificent proportions and elegant and tasteful fitting up commanded unqualified admiration. She was built for the company by Harlan & Co., Wilmington, Del., by whom her machinery was also supplied; the engines were designed by Mr. Herman Winter. The length of the *Old Dominion* at the water-line is 255 feet, and on the deck 263½ feet. The width of the beam is 41 feet 6 inches, and the depth at the base line 23 feet 7 inches, and she was built according to the rules of the New York Shipmasters' Association; she rates A 1 with a crossmark for 16 years; her tunnage is 2,222 80-100; she has one single walking-beam; her engine cylinder is 75 inches diameter, with 11 feet stroke, with 7 condensers, 2 tubular boilers, with 5 furnaces to each; her wheel is 30½ feet diameter and 15 feet 3 inches on the face; the gallows frame is iron; a centrifugal pump and two hoisting engines.

Pratt's Registering Tell-tale Clock.

A VERY useful adjunct to the factory or works is now being introduced to the public by Messrs. John Bailey & Co., of Salford, Manchester, England. This is a watchman's electric tell-tale clock, the arrangement of which is due to Mr. F. M. Pratt, the above firm being the manufacturers.



PRATT'S REGISTERING TELL-TALE CLOCK.

The improvement upon previous apparatus for the purposes of checking the watchman on his rounds consists in the application to any ordinary clock of a vertical drum which is driven by the mechanism of the clock. Upon the drum is a sheet of paper, so attached that it can be removed and a fresh sheet substituted when required. The paper is divided vertically into hours, and by means of horizontal intersecting lines into as many divisions counted vertically as there are places to be visited by the watchman. Each vertical division has a marker which is actuated by electro-magnetic apparatus. The electro-magnet is brought into action by the watchman completing the current by pressing the actuating knob at the corresponding station. The armature is attracted and imparts a vibrating motion to the marker, the point of which impresses a dot on the sheet of paper through the medium of a piece of carbonized ribbon. Fig. 1 of our engraving shows a front elevation, and Fig. 2 a transverse vertical section, of the apparatus. The revolving drum with the recording paper attached is seen in the centre of the upper part of the clock case, the markers and electro-magnets being arranged on either side. The wires are led away through the back of the apparatus to the various stations. Should the watchman from any cause be detained for any length of time in one room, the cylinder may have carried the square for the next station beyond the marker. That square will thus be left blank, and the watchman will have a *prima facie* case of neglect made out against him. In such a case, and to prevent this, he repeatedly touches the actuating knob in the apartment in which he is detained, which causes a series of marks to appear in the square connected with it, and thus accounts for the absence of a mark from the next one. Mr. Pratt has also designed a very simple method of working the apparatus by mechanical means, but this arrangement is only chiefly applicable under conditions of small area and with the means of direct action. The clock is placed beyond the reach of the watchman, and an inspection in the morning reveals the fact as to whether he has been negligent or punctual in his rounds. The apparatus is sufficiently simple in arrangement and efficient in working to merit general adoption.

Absorbing Power of Wood.

WOOD contains about 4 per cent. of soluble and 96 per cent. of fibrous material. It forms a hard, porous tissue, the size and number of the pores varying with the kind of wood. The fibrous portions of all woods are heavier than water, and have a specific gravity about equal to the fiber of flax, or 1·5. The fibers are not continuous throughout the stick, but are short and overlap, arranged in echelon. Wood floats in water consequently by virtue of the air confined in the cells. When completely saturated with water, all woods must sink. Dried at 86° Fahr., 1 lb. troy of wood yields, by distillation, 7 oz. wood acid, 1¼ oz. combustible oil, and 3¾ oz. charcoal. The variation in different woods is not very great.

Experiments were made by Mr. Merrill, at South Boston, to determine the quantity of coal-oil absorbed by wood. Pieces of green birch were boiled in oil. When the temperature rose above 212°, bubbles escaped in great numbers from the ends of the sticks, and in small quantities also from the sides, showing that the expulsion of water did not proceed from the ends only. At 300° the bubbles ceased. Upon removing from the fire, the wood, which had floated on the surface of the oil, sank to the bottom. The specific gravity of the oil was 1·025°.

A second experiment was made, after carefully drying the wood, at a temperature of 286°, to expel all free moisture. When boiled in the oil, bubbles were produced, but not as copiously as before, which Mr. Merrill explained by the supposition that the oil had effected decompositions, and liberated portions of the water of combination. In the second experiment, the absorption of oil was less than in the first, for the specific gravity of the pieces operated on was exactly equal to that of water, while those first treated became heavier than the oil. This observation is important in its bearing upon the treatment of wood. Green timber was more completely saturated than the dry, and the explanation is very obvious.

Water, when heated to 212°, expands 1,700 times, while the expansion of air in 100° is only $\frac{11}{30}$ of its volume. It follows from this, that if the cells of the wood are filled with air, an increase of temperature, from 60° to 212°, will expel $\frac{56}{100}$, or about one-half, while, if the cells are filled with water, the quantity expelled, by being converted into steam, will be thirty-four hundred times as great.

It was also found that the saturated wood was more than double the weight of the dry wood, that the quantity of oil absorbed by white birch was 3·75 gallons per cubic foot, and its weight 32 lbs., at a cost for the oil only of 34 cents. At this rate, the oil required to saturate a cross-tie would cost 90 cents, exclusive of cost of process.

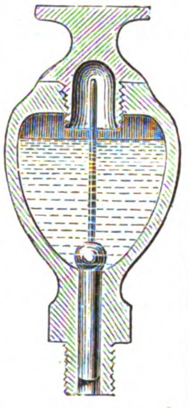
Other kinds of timber are more porous, and would absorb much larger quantities.

It would appear also from these experiments that, if the white birch be supposed to have been completely saturated, the volume of the cells slightly exceeded the volume of the solid fiber, or that more than half the wood consisted of cavities.—*Herman Haupt, in Van Nostrand's Magazine.*

PNEUMATIC VALVE LUBRICATOR.

THIS invention is an improvement upon the ordinary pneumatic lubricators, and introduced and manufactured solely by Messrs. Shaw & Co., of Mill Street Works, Pendleton, near Manchester. Practical objections and difficulties in the effective fixing and working of the open-tubed and the needle lubricators in common use led the patentees to devise means of obviating these defects, and especially of improving the method of regulating the flow of oil from the bottle; which is similar to that of the needle lubricator. There is usually a wooden stopper or plug with a metal tube inserted therein; but, in lieu of a wire or needle being placed in the tube, which, by its continued friction, ultimately cuts a groove in the shaft on which it rubs, a peculiarly shaped valve is seated on the inner end of the oil passage, as shown in Fig. 1. When the shaft is in motion, its slightest vibration causes an oscillation of the ball of the valve in its seat, thereby permitting the lubricant to flow down the tube in minute quantities. But the valve is stationary, and the oil ceases to flow when the shaft is not in motion.

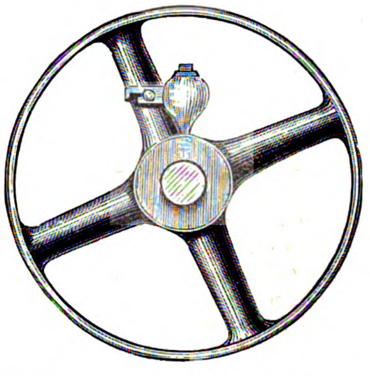
FIG. I



One of the most useful applications of this principle is as a lubricator for the oiling of the bearings of loose pulleys, for which it is particularly adapted, and an efficient and economical lubricator for this purpose has long been a desideratum for users of machinery. It is estimated that, in a general way, as much as 75 per cent. of the oil used in oiling the bearings of loose pulleys by hand flows away from the bearings without producing any useful effect, and it is scattered about by the revolutions of the pulley, causing dirt, inconvenience, and waste; moreover, oiling by hand is attended with danger. Our illustrations show at Fig. 1 the adaptation of the patent pneumatic valve lubricator to loose pulleys. It will be seen that the oil passage is fitted with a small plunger, on which a valve is formed, accurately fitted to a seating that closes the inner end of the passage. When the loose pulley is running, it imparts a slight motion of vibration to the plunger, with corresponding oscillations of the valve that permit a small quantity of oil to flow, while waste or excessive supply is effectually prevented.

In Fig. 2 is shown another adaptation of the same lubricator, to be attached to an arm of the pulley. The same kind of lubricator is also manufactured in brass of different sizes for engine cranks, and this form has met with universal approval where tried. The action of these lubricators is certain and unfailing so long as there is a supply of oil; it is intermittent, ceasing

FIG. 2.



entirely when the working parts lubricated thereby are at rest; it is but little, if at all, affected by variations of temperature; finally, it is economical, alike in first cost and in working, durable and easily affixed, or substituted in lieu of the needle or other lubricators with plugs or tubes that can be taken out, for which purpose valves are supplied separately; and as no part of the lubricator touches any shaft to which it is applied, damage to the shaft by wear is avoided.

The principle and action of this invention have undergone long-continued and severe tests during the last twelve months, and among many who have tried and found them worthy of adoption may be mentioned Messrs. Platt Bros., the eminent machinists of Oldham, whose machinery assumed so prominent a place in the western avenue of the International Exhibition at South Kensington last year.—*Mechanics' Magazine.*

Vertical Boilers.

THE popularity of vertical boilers proves that they serve a useful purpose. Taken as a class, they are the most uneconomical steam-generators in existence; but all mechanical engineers know that they are extremely convenient, and that, however wasteful they may be of fuel, they can generally be depended upon to make a great deal of steam in a very short time; and it must not be forgotten that a few vertical boilers are not only rapid steam-generators, but exceptionally economical as well. The most remarkable point about vertical boilers, however, is the apparently endless varieties of form which they have been made to assume by different inventors. It would appear that the principles which determine the construction of steam-generators, whether vertical or horizontal, must be well understood, and that only certain forms will comply with these principles. For example, the tubular horizontal boiler is always nearly the same all over the world. The Cornish boiler is as universal as the steam-engine. We may take at haphazard twenty steamships leaving the port of London, and we shall find that the boilers of nineteen of these steamers are practically identical in everything but dimensions. Yet, in spite of all this, the moment we come to deal with the vertical boiler, properly so-called, we find ourselves face to face with perfect curiosities of mechanical construction altogether unparalleled. For some reason, the nature of which is in a sense a mystery, the inventors of steam-generators have reveled in the vertical boiler as a type with which it was possible to do anything. The consequence is that, perhaps, no apparatus intended to perform a single function has ever assumed so many forms, or presented so many differences of constructive detail. . . .

We shall not have far to seek for the causes which have led to the neglect of the true principles of boiler-making. The inventors have, in all cases, endeavored to get the largest possible amount of heating surface into the smallest possible space; and the moment we determine to neglect all other considerations, it is very easy to design a boiler. There is a story told of a certain clockmaker who made a bet that he would invent a new escapement every day for a year, and we believe it to be quite possible to invent a new boiler every day for two years. The clockmaker did not pledge himself to invent good escapements, and we should not pledge ourselves to invent good boilers. But all such ingenuity is wasted. The best boiler is not necessarily that which has the most heating surface, nor that which is most economical in fuel; and we would urge, especially on young engineers, the importance of always bearing in mind that it is quite possible to design vertical boilers which will prove fairly efficient and yet be easily made and repaired. The essence of success in boiler-making lies in combining a number of conflicting conditions in such a way that they may be brought into more or less harmony with each other. The inventors of horizontal boilers have been much more successful in doing this than their brethren who have worked solely on the vertical type. Why this should be the case, as we have already stated, we are unable to say. Our object in writing this article is fulfilled if we can succeed in impressing on the engineer, young or old, who makes or designs boilers, the absolute necessity of constantly bearing in mind that no boiler can be considered good, or trustworthy, or successful, that does not admit of being cleaned and repaired with facility at a moderate cost. Good circulation and efficient combustion must also be secured. In no case can success be attained by giving up the requisites we have first named, to obtain those last mentioned. Those who wish to study the subject at length will do well to examine the curious, in some cases amusing, and in all instructive examples of boiler engineering which Mr. Burgh is now giving to the world.—*Exchange.*

The East River Bridge.

THE East River Bridge is making slow but steady progress. The engineer in charge announces that the bed-rock under the caisson on the New York side has just been uncovered, and that the underground work will probably be completed by the first of June.

THE gigantic truss wall and towers of the Coliseum, now in process of building in Boston for the International Musical Jubilee, were blown down the evening of April 27. One of the end towers had reached the height of 110 feet, while the truss destroyed was 140 feet high, and had a span of 300 feet. Nearly 50,000 feet of lumber had been used in the construction of the truss. The wind was blowing at the rate of forty miles an hour when the disaster occurred.

Steam Power for Canals.

WITH the reopening of canal navigation, which will be delayed only long enough to give time for necessary improvements, we may look for a revival of the popular interest felt in the question of steam traction. Whether anything will be brought forward during the coming summer which the commissioners can regard as fairly entitled to the State bounty of $100,000, is, of course, a matter of uncertainty. A number of new inventions are to be entered for trial, and several of those unsuccessfully tested last year are to be brought out a second time, with such improvements as those interested may think necessary to remedy defects developed in previous experiments. It is not improbable, therefore, that an award will be made at the close of the season; but, it does not follow that, because such an award is made, a practical solution of the important question of the economical application of steam power to canal tunnage will have been reached. The best of the inventions entered for the trials may be essentially defective in many important features, and the most we expect from the well meant, but somewhat injudicious, efforts of the legislature in this direction is, that they will stimulate inquiry and prepare the way for the invention of some form of tug which shall develop the requisite power to enable it to do effective work in the narrow and shallow water of the canals.

Of the inventions so far brought to the notice of the commissioners, the greater part are absolute and hopeless failures. A few have succeeded in some respects, but the best of them have failed to show an economy as compared with horse-power, even allowing for the saving of time effected in making a through trip. In most instances, the want of success which has attended the application of inventions designed to meet the requirements of canal traffic may be attributed to the fact that their inventors have not understood the nature of the problem for which they have been so ready to propose solutions. The popular idea is, and has been from the first, that what is wanted is a steamboat that will sail on the canals at a fair average speed, carrying a cargo about equal to that usually carried by canal-boats, and propelled by some kind of screw or paddle which will not agitate the water so as to make a "wash" that will injure the banks. The idea is a mistaken one, both as regards the kind of steam canal-boats needed and the propelling machinery required to move them. As long ago as 1858, Mr. Prosser, for many years prominently identified with the business of canal transportation in this State, made a series of very costly experiments with boats answering this description. In that year a number of propellers were built with especial reference to carrying capacity, and equipped with superior machinery and screws of as large size as could be used on the canal. These boats carried all the freight that could possibly be put upon any kind of steamer that would pass through the locks; they attained a fair average speed and did not wash the banks; but after a satisfactory trial they were withdrawn as unprofitable in competition with boats towed by horses, and were placed upon the Hudson River, where, we believe, they have all done good service ever since. No subsequent experiments have been equally successful, although those above referred to were not successful enough to justify the properties of the propeller in continuing them in canal service. The only objection to the screw is that it does not develop sufficient power in the narrow body of water in a canal to move enough tunnage to show for steam an economy as compared with horses No modifications of the screw will overcome this original difficulty, and the same objections apply with still greater force to nine-tenths of the inventions brought out up to the present time.—*Iron Age.*

Rope Tramways Underground.

A RECENT writer (hailing from Bonn, Germany) has the following concerning the subterranean use of rope tramways:—

"The coal-mines of the Saar are situated in a hilly district, intersected by many branch valleys which lead to that of the river Saar. This configuration of the country, and the circumstance that the coal measures come up to the surface over a large area of the district, were singularly favorable for the opening of the coal-fields by means of adits and levels instead of shafts; and although a great part of the coal-beds above these adits is already exhausted, they are still used to bring the coal on the surface to the smaller valleys, where each is provided with a branch railway. The wagons or tubs used to be drawn by horses in trains of 15 to 20; but, as this system was connected with many inconveniences, it is now abandoned, and the wagons are drawn in and out by stationary steam-engines, after being fastened to long ropes or chains. There are now three different systems of rope tramways in use. The counter-rope system has been adopted at the mine, Von der Heydt, in an adit 1,024 fathoms long, from the Krug shaft to the tip at the railway station, and in the Lampenest adit 1,420 fathoms to the same pit; it is also used at the mine Reden-Merchweiler, for a length of 800 fathoms. This system consists of two engines—one in the mine, one outside, alternately pulling a train of 30 to 36 wagons out or in, when the end rope runs freely off the winding drum, which is for a time disconnected from its engine. The tail rope system, which is also used at some collieries near Newcastle and Durham, has been adopted at Veltheim adit, mine Gerhard Prinz Wilhelm, and at the Burbach adit, mine Von der Heydt, for 1,400 and 1,020 fathoms of length respectively. With this system a single steam-engine is required, which drives two drums in opposite directions, one hauling in the rope, the other paying it out, when the rope at each end of the tramway is carried round a sheave or pulley, and is conducted back to the engine. The train of coal-wagons being connected to one branch of the rope, and the train of empty wagons to the other branch, the engine pulls the loaded train out, and drags the empty train into the mine, and is reversed after every journey. The endless rope system is in use at the Grühling adit mine Friedrichsthal, and the Abhub adit mine Gerhard, and consists in one engine driving an endless rope continuously round in the same direction, when loaded trains are fastened to it on the way out, and empty trains on the way in. This system is generally only adapted to short distances, such as 120 fathoms and 80 fathoms in the named instances. Instead of attaching the wagons in trains, it is now found more useful to fasten them singly at certain intervals, so that the tipmen have time to empty one wagon over the screen before the next arrives. The expenses for working the rope tramways have proved to be much less than for horse tramways, and the counter-rope system to be by far the cheapest. But it seems that it would be still more economical to introduce the endless rope system, even for long distances, with two engines running in the same direction, and to attach single wagons instead of trains to the rope. The advantages of the single wagon system are too conspicuous to be overlooked, but it is only in connection with the endless system they can be fully developed. The difficulty of the increasing dead-weight of the rope for great distances must be overcome by the adoption of auxiliary engines, which run in the same direction with the chief engine, and the regulation of their speed can be easily effected by the use of telegraphing machinery and self-acting brakes and governors. The underground transport through the roadways has always been a heavy item in colliery economy, and every improvement in that direction should be thankfully accepted. There is much still to be done in this matter, and the use of electric telegraphic apparatus in connection with underground transport is at present far too little valued."

British Biscuit Making.

GREAT inconvenience was formerly experienced in time of war in producing biscuits fast enough to keep the British ships supplied, and the biscuits were not of uniform quality. For these reasons, Mr. Grant, of the Royal Clarence Yard, introduced a new system of manufacture in 1831. The flour and water are first thoroughly mixed in a trough by revolving arms, about 450 lbs. of dough being produced in six minutes. The dough is then put on a heated platform and run over by polished cast-iron rollers weighing about 15 cwt. each, until it is sufficiently thin; it is then cut into hexagons, to avoid all waste, by a cutting machine, and each biscuit is "docked" or pierced with holes at the same time. The biscuits are not cut completely out, but nicked all round. The entire sheet of biscuits is then put in the oven at once, and when baked it is broken up by hand into separate biscuits, the sheet giving way easily wh re it has been nicked by the stamping process. It will be seen presently that there is very little in common between this method of manufacture and that adopted by the Reading firm of Huntley & Palmer, which is described as follows in the *Engineer*:—

With one or two exceptions, all biscuits are produced in the same way. A dough is first made, and this is then stamped into biscuits, which are subsequently baked, *boiled*, and variously manipulated according to the species. We first enter the mixing-room, then, in which are five or six machines used for making fancy doughs, and about as many used for plain biscuits. They are totally unlike each other. The "fancy" machines consist each of a miniature mortar mill, the cast-iron pan of which is about 4 ft. 6 in. diameter, and a foot deep. This revolves at some fifty revolutions per minute under a single heavy roller, nearly as wide as the semi-diameter of the pan. In some cases the rollers are smooth, in others grooved. An attendant stands by each pan, and is supplied with the requisite proportions of treacle, sugar, butter, lard, whipped eggs, milk, etc., in large, round iron buckets or drums. Over each pan is a canvas shute, down which the requisite quantity of flour for one batch descends when required. The attendant is armed with a great wooden spatula or shovel, with which he turns over and mixes the materials, which are quickly reduced to a smooth homogeneous mass by the roller. From the pans the mass is transferred to barrows, where we shall leave it for a moment.

The "plain" mixers are horizontal cylinders, about 3 ft. diameter and 4 ft. long, traversed by a horizontal shaft, armed with knives, by the rotation of which the body of materials is quickly reduced to the condition of dough. The bottom of

the cylinder is then allowed to fall down, by a very ingenious piece of mechanism, and the contents put into barrows.

The next process consists in converting the dough into sheets, and stamping it into biscuits. The machinery used in this is among the most ingenious and perfect we are acquainted with as employed in any manufacturing process; but as it is in great measure, if not altogether, the results of the experience of the firm, and in some respects unique, we refrain from giving any minute description of it which might serve as a guide to persons desirous of erecting similar plant. Our business is at present with biscuits, and not with machines.

One general principle is embodied in all the biscuit machines. The dough is passed between a pair of breaking rollers, under which runs an endless web of pure white felt. As it passes through the rollers it falls on the web, and is carried back to the attendant, who, again seizing the end of the sheet of paste, puts it between the rollers. This operation is repeated twice. The third time, after the dough—now in a sheet some 8 feet long and 2 feet 6 inches wide—has just begun to issue from the breaking rollers, it is laid hold of by a boy and placed on a second endless band running up an incline and lying at a higher level than the endless belt just named. This second belt is of a very thick pure white felt. It travels round a roller about 12 inches in diameter, and 8 feet or 9 feet—measured horizontally—from the breaking roller. Round the belt roller the sheet of dough, clinging closely to the felt, is carried. Opposite the roller is a vertical frame, oscillating on pins at the lower end. The upper end of this frame carries a set of swing stamps. The frame, set in motion by the gearing, alternately approaches to and recedes from the roller. As it approaches, the swing stamps assume a horizontal position, and strike the sheet of dough, which is caught between the stamps and the roller. The former each cut out a complete biscuit of the required form. As the swing frame retreats, the stamps assume a vertical position, and deposit the biscuits on a third endless band, by which they are carried to a set of open wire trays, on which to be baked. They are quickly arranged on these by a boy. It is obvious that as the biscuits are of various irregular shapes, much of the dough is left between the stamps. This falls on a short endless web under the machine, by which it is carried to an attendant, who takes it away to be worked up again. We are aware that we have given an imperfect idea of the action of this very beautiful machine, which, when at work, appears to be endowed with almost human intelligence; but pages of description, copiously illustrated, would be required to make the reader acquainted with all the minutiæ on which the success of the apparatus depends. In some of the machines the stamps work vertically over the sheet, leaving the biscuits on one endless band, while the open-work web of dough from which they have been cut goes in an unbroken net up another endless band, and so out of the way for re-working. The next process is the baking of the biscuits, but, before proceeding to the ovens, we must describe the extremely curious way in which some of the smaller biscuits, such as the "ratafias," "cocoa-nut," and one or two others, are made by hand.

The dough for such biscuits is incorporated in special mixers made of wood, and of comparatively small size, because the biscuits, being necessarily expensive, and appealing to the tastes of a limited section of the public, are not produced on a very large scale. The mixers are simply large wooden boxes within which a horizontal shaft armed with paddles or spades rotates slowly, thoroughly incorporating the ingredients. The resulting dough, unlike that used for ordinary biscuits—which is very hard and leathery in consistence, the smallest possible quantity of fluid being used in its preparation, in order to insure crispness—is in the case of "ratafias," "cocoa-nuts," etc. semi-fluid. In other words, it is a thick paste. Proceeding to another department but a few yards off, we find eight or ten white-capped, white-aproned men hard at work making the dough into biscuits in the following way:—Each man is provided with a kind of waterproof bag, capable of holding a pound or so of dough. The bag has at the lower end two tin orifices, jets, or tubes. The bag being supplied with the proper quantity of dough, the upper end or mouth is twisted up to close it. The bag is then grasped by the workman in a way impossible to describe. By squeezing the bag the dough can be made to flow out of the tubular orifices. Opposite each man is a sheet of that peculiarly thin paper with which everybody who eats sweet biscuits is no doubt familiar. Holding the dough-bag over this sheet of paper, the workman, beginning at the left-hand side of the sheet of paper, squeezes the bag gently, and thereby forces out two big gouts or drops of dough; a jerk detaches these from the bag, and behold two ratafias on the paper ready to be baked. A slight motion of the hand to the right, another squeeze and a jerk, and two more biscuits lie in a line with the first, and so the operative proceeds line after line till his paper is filled. The operation is very simple to look at, but it requires great sleight-of-hand to work at a high speed, and yet make all the biscuits as nearly as possible of the same size. The rapidity with which a man will cover a large sheet of paper with little dabs of biscuit-dough is really remarkable. The whole operation constitutes one of those feats of manipulation perfection in which can only result from long and careful practice.

We may now proceed to consider the means by which the biscuits are baked. On the ground floor are eight or ten ovens of very large dimensions. These are all heated by hot-air flues from separate furnaces. There are certain points of difference in the construction of the ovens which we do not feel at liberty to describe. It will answer every purpose to state that the general principle consists in depositing the unbaked biscuits on an endless web of wire or of flat bars of iron, which, continually moving through the oven at a velocity regulated by the size and nature of the biscuits to be baked, carries them through in from five to ten minutes. The biscuits are continuously fed in at one end, and are continuously delivered into hoppers or boxes placed to receive them at the other. The delivery ends of the ovens open into the sides of a long and rather dark passage. No machinery is to be seen here, nor any trace of fire—nothing, in short, but a series of long, narrow, horizontal openings, like that of a gigantic letter-box, in the walls, and beneath these the boxes to receive the biscuits. These last come tumbling through the wall without visible cause, at short intervals, in ten or a dozen at a time, just as though the street ran outside the wall, and a great public, who used biscuits instead of letters as a means of corresponding with their friends, kept on posting biscuits all day. The incautious visitor who picks up one of these incoming morsels is likely to feel sensations of keen regret immediately afterwards, the biscuits being quite hot enough to inflict a mild burn.

A very large proportion of the biscuits thus made are finished as soon as they are baked, but this is not true of all—some require to be ornamented. This ornamenting is effected in various ways. In some cases a glaze of sugar properly colored is put on before they are baked; in others, the biscuits proceed to the fine art department. Here we have a light, airy studio, in which we find four or five artists—we can find no more suitable title—some engaged in decorating supper cakes, others building up a magnificent wedding cake, carefully preserved during such time as the builder is not at work, under a glass shade; others again are at work on biscuits—pretty little things for dessert; some of these have a bright red sugar glaze on them; these are being decorated with ships, swans, roses, branches, or geometrical patterns. The pencil used by the artist is simply a bag, similar to that used in making ratafias, and already described, with the exception that it is very much smaller, and fitted with but one small nozzle, the hole in which is less than a sixteenth of an inch in diameter. The white thick pigment used by the artist is simply a preparation of white sugar, and with this pencil he turns out all manner of dainty devices, with a skill, taste, artistic feeling, and endless powers of invention which must be seen to be appreciated as they deserve.

We have stated already that biscuits are some times *boiled*. Two or three sorts are thus treated; of these we may particularize the very light crisp cracknels, triangular in shape, with the corners turned up. The boiling process is one of the most curious conducted by Messrs. Huntley and Palmer. At the top of the house, in a little out-of-the-way room, we find a large caldron heated by steam, and nearly full of water boiling away merrily. Into this caldron the cracknels are thrown just as they come from the stamping machines. They sink at once to the bottom, where they remain for about five minutes. The moment they are sufficiently cooked they float up to the top, and are skimmed off with a wire skimmer. They are then sent down-stairs to be baked.

Economy of the Hot-blast.

In the year 1828, J. B. Neilson patented an "improved application of air to produce heat in fires, forges, and furnaces, where bellows or other blowing apparatus are required." This discovery consisted, as is well known, in heating the air before it is propelled into the furnace; and although, from the title of the patent, Neilson and his colleagues appear to have expected to see it generally employed in all furnaces driven by compressed air, its use has, practically, been exclusively confined to those employed in smelting the ores of iron.

In 1834, Monsieur Dufrenoy was sent over to England, by the Director-General of Mines of France, to report to the authorities at Paris on an invention which at the time was truly described as one revolutionizing, in Scotland at all events, where it was first put into practice, the art of making iron.

This gentleman in a report gave good reasons apparently for this statement, by quoting the experience of the owners of Clyde Iron-works, which was as follows:—

For the year	1829	1831	1833
Temperature of blast	Cold	450° F.	612° F.
Coal used per tun of iron	As coke.	As coke.	In raw state
For fusion, cwt	133	86	40
For heating air, raw coal	nil	5	8
For blowing engines, coal	20	7	11
	153	98	59
Cwt. limestone per tun of iron	10½	9	7

From this it would appear that heating the air with 5 cwt. of coal had saved 47 cwt. of fuel in the furnace, and 8 cwt. similarly applied had been

followed with an economy of 93 cwt., or above 69 per cent.

Besides this advantage, the make was increased by more than one-third, and a blowing engine, which only supplied three furnaces with cold blast, was equal to four when the air was heated.

The iron trade hesitated somewhat in crediting that the heat generated from 8 cwt. of fuel burnt outside the furnace, should be able to perform the duty of a very much larger weight burnt inside. Some writers on the metallurgy of iron, when speaking of the advantages of Neilson's system, have perhaps not been sufficiently careful in drawing a distinction between the saving directly due to its application and that arising in a collateral manner from its use. Looking at the question, however, in its commercial sense, the figures and language quoted from the work of Dufrenoy justified the character he gave to it. —*Jour. Iron and Steel Inst.*

Water-fuel.

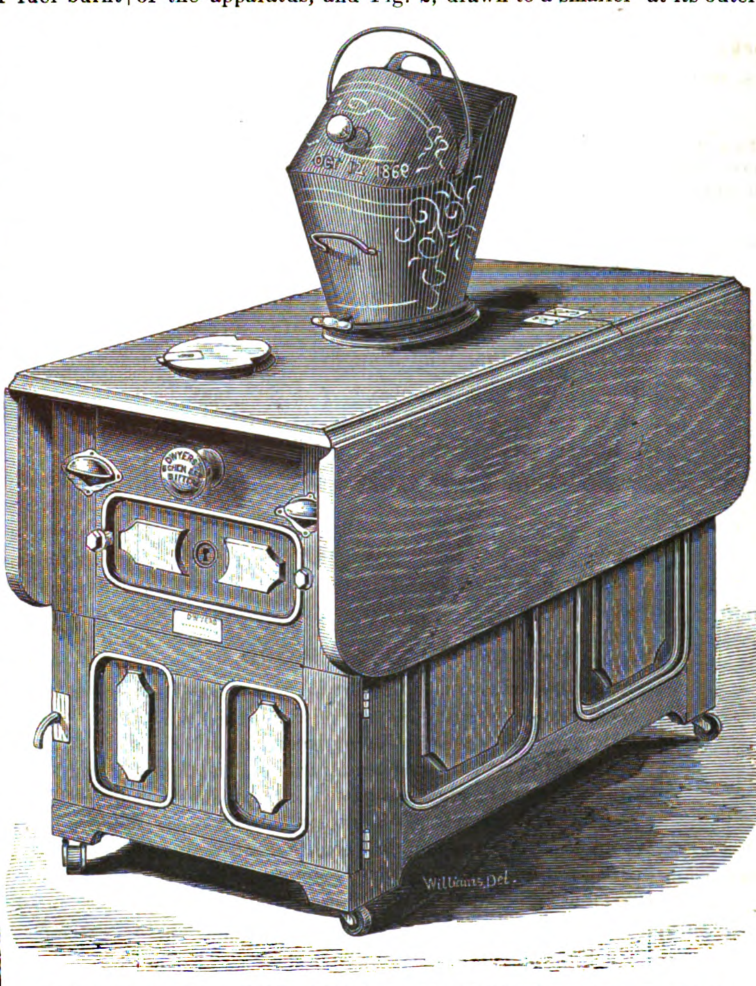
WILL water burn? And if so, can burning water be used at a moderate cost for fuel! The public mind of Peoria, Ill., has been of late much exercised upon these questions. A stranger and a Yankee came to the city, and claimed that by burning mixed water and oil in it, he could heat a common cooking stove red-hot in five minutes. The proportions were four gallons of oil to five gallons of water, and with this quantity the inventor declared that he could run a steam-engine for thirty days, heat twelve furnaces, or light a whole city with gas. The oil was worth fifty cents a barrel, and cooking, heating, and lighting were thus to cost almost nothing. A stock company was started to push the enterprise, and it was found that by the aid of twelve gallons of oil, two gallons of water could be evaporated. It did not promise overwhelming dividends. The corporation disembodied itself as fast as possible, and the inventor, packing up his gas-pipes and oil-cans, left Peoria to enlighten and warm some other region.—*N. Y. Tribune.*

NEW YORK DOCK IMPROVEMENTS.—An immense landing-place for boats will soon be built in the new granite river wall opposite Battery Place, N. R., by the Dock Commissioners, at an estimated cost of $25,000. It will be of granite, brick, and concrete, with a total length of 136 feet and a width of 13½ feet. There will be five landing platforms, as follows:—One for high tides, 44 feet in length and 9½ feet broad; two for mean tides, 16½ feet in length and 9½ feet broad; and two for low tides, 16½ feet in length and 9½ feet broad.

THE engineer corps of the New York Dock Department, while engaged, April 25, in taking "borings" of the composition of the river-bottom off Pier 51, North River, pierced, at a depth of 80 feet, a subterranean reservoir, the water ascending the tube with such force as to rise several feet above its mouth. To the astonishment of the workmen, the water was found to be fresh and of an agreeable taste.

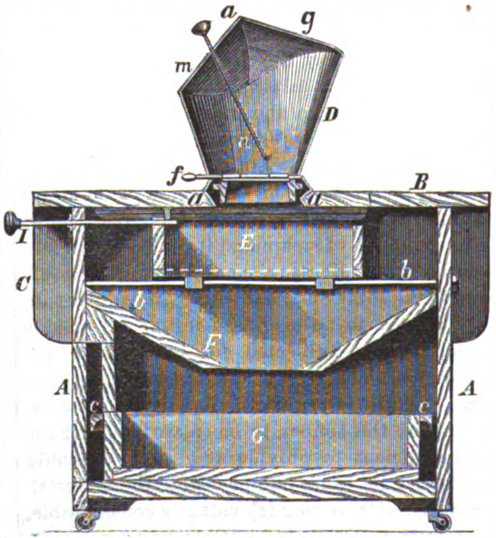
Dwyer's Patent Coal-ash Sifter and Table.

THE object of the invention herewith illustrated is to provide a sifter and ash-receptacle that may be used in any apartment without allowing the dust to fly over the furniture therein, and that, also, when not in use as a sifter, may be made available as a table. Fig. 1 is a perspective view of the apparatus, and Fig. 2, drawn to a smaller scale, is a vertical transverse section of the same.



DWYER'S PATENT COAL-ASH SIFTER AND TABLE.

A are the sides of a rectangular box, the top, B, of which, with the lateral hinged leaves, C, constitutes the table. In the center of the top, B, is an opening, *a*, into which is fitted the bottom of a hod, D, and which, on the removal of said hod, is fitted with a suitable plug or piece lying flush with the surface of the table. Within the upper part of the box is a sieve, E, capable of a reciprocating movement upon guides, *b*, at the sides. Below this sieve is a funnel, F, and underneath the throat of this last is arranged a receptacle, G, furnished with side or handle-pieces, *c*, by which, when required, it can be conveniently carried. I is a rod passing through one side of the box, A, furnished at its outer extremity with a knob, and at its inner end with prongs, so applied that, by giving an axial motion to the rod, the same may be connected to or disconnected from the contiguous end of the sieve. The hod, D, is constructed with a movable bottom, so made that it can be reversed by an axial movement of the pivotal rod, *f*. The top of the hod, furthermore, comprises the movable cover, *g*, hinged at *a'*, and the fixed portion, *m*, through which, into the interior of the hod, passes the stirrer, *n*, whereby the contents of the hod may be loosened preparatory to dumping the contents, by the just mentioned movement of the hod bottom into the sieve. This done, the hod being removed, clinkers may be picked out from the sieve by hand and thrown into the funnel, whence they fall to the receptacle below. This done, the opening in the table is closed either by the hod or the plug previously referred to, and the sifting is performed by giving a vibratory movement to the sieve through the agency of the rod, I, the hopper conducting the ashes to the receptacle below, and this latter, when filled, being removed through doors in the side of the box, and emptied into any suitable place of deposit, the sieve, on the detachment therefrom of the inner end of the rod, I, being capable of removal for the emptying out of the coal, cinder, etc. It will be seen that the sifting operation is carried on within the apparatus, wholly closed to the external atmosphere, and consequently any flying or distribution of dust in the apartment is avoided. And when not in use as a sifter, the simple closing of the opening on the top of the box fits the whole for all the purposes of an ordinary table. This improvement was patented, through the "American Artisan Patent Agency," on Oct. 12, 1869, by Patrick J. Dwyer, of Elizabethport, N. J., who desires to sell either the whole right or separate State rights, and to whom all inquiries for further information should be addressed.



AT Adelaide, South Australia, they had twelve of the hottest kind of days last January. All this while, the thermometer at night never fell below 82°, and in the day-time the mercury went bubbling up to 108° in the shade. The temperature of the hydrant water rose to 89°.

IN some of the Western cities it is proposed to put red glass in the street lanterns to show the location of fire-alarm boxes, and green glass to designate the position of letter-boxes.

IN Rome, they have a moving steam kitchen for cooking for the poor. It will cook for 1,500 persons a dinner in less than an hour and a half, and at a cent a plate.

AMERICAN ARTISAN

BROWN & ALLEN, Publishers,

ISSUED WEEKLY AT

No. 189 Broadway, New York.

H. T. BROWN. L. ALLEN.

AGENTS.

AMERICAN NEWS COMPANY, New York City; NEW YORK NEWS COMPANY, New York City; NEW ENGLAND NEWS COMPANY, Boston; A. WINCH & Co., Philadelphia; H. TAYLOR & Co., Baltimore.

WEDNESDAY, MAY 8, 1872.

CONTENTS OF THIS NUMBER

[Illustrations are indicated by an asterisk.]

PUBLISHERS' ANNOUNCEMENT.

OUR readers will not only observe some changes in the general make-up of our paper, but will also notice in this number that a new name has been substituted for that of one of the former publishers.

Mr. J. W. Coombs, whose name has long stood in connection with that of Mr. H. T. Brown, has, we regret to say, so far declined in health as to render imperative his present retirement from active business. His interest in the late firm of BROWN, COOMBS & Co. has been purchased by Mr. Leicester Allen, who, for the last four years, has filled the responsible position of associate editor for our able cotemporary the *Scientific American*. Mr. Allen will now assume the editorial management of the AMERICAN ARTISAN.

These changes are the beginning of a series of improvements which we hope to carry out, and which, we trust, will not only enhance the interest and usefulness, but greatly extend the circulation and influence of our paper. The improvements contemplated will be made gradually, and as warranted by increasing prosperity, our aim being, if not ultimately to excel, at least not to allow any publication of the kind to surpass our paper in extent and worthiness of contents or in beauty of execution.

Able contributors will enrich our columns from time to time with articles of practical value and scientific interest. It is our purpose to avoid such abstract discussions as can only be interesting to a few, and to adopt a popular style that will enable us to exert an educating influence upon a larger number of readers, rather than to cater specially for any particular class or profession. In other words, we propose to make our paper an exponent of general industrial and scientific progress. Communications from any of our readers containing interesting and practical information will be always welcomed.

The new firm of BROWN & ALLEN will continue the extensive Patent Agency business hitherto conducted by Brown, Coombs & Co. This department will be, as heretofore, under the management of Mr. H. T. Brown, whose long experience in both American and foreign business, as well as his marked ability as a patent solicitor, is well known to thousands of successful American and foreign inventors. He will be assisted by a staff of able examiners and draughtsmen, and those who intrust their business to our care may be certain that it will be promptly and faithfully attended to.

We confidently hope for the cordial co-operation of our old friends and subscribers, and shall endeavor, by their aid and our own earnest efforts, to secure many new ones.

PRESERVATION OF WOOD.

WE have in course of publication Mr. Buell's paper, read before the Society of Practical Engineering, on the preservation of wood, and which sketches at length the *modus operandi* and results of the various processes suggested or tried during the past half century. We notice that Herman Haupt has lately made public some recent experiments in the same line, which—too lengthy for full mention here—tend to corroborate the opinion that none of the methods hitherto devised has yet been brought to a point of utility warranting its general introduction. Experience has, however, demonstrated that certain conditions are essential to the introduction of any preservative material into the tissues of the wood. Foremost among these is the expulsion of moisture and air from the cells previous to the injection of the antiseptic. The water can be driven off by heat, but the air only by a vacuum, which must of course be maintained throughout the process, or until the pores are completely filled with the preservative agent. To produce this vacuum an air-pump is found to be far from the most effective means, being, indeed, much inferior to that provided by filling the vessels containing the timber with water and then permitting the outflow of the water to tanks arranged at a level, say forty feet below. The introduction of steam and its subsequent condensation also affords a comparatively feasible means to the same end; but some care would manifestly require to be exercised in the use of this method, as wood subjected for too long a time to steam becomes trashy and unfit for any use where strength is required. A vacuum thus insured about the timber to be treated, oleaginous vapors sufficient to provide against decay could undoubtedly be caused to penetrate the material, but the cost of treatment is evidently considerable, and no little care and skill need to be exercised in conducting the operation.

The process just indicated will probably be found among the most feasible for pieces of wood of only moderate size, such as blocks for paving and the like. For large timbers, such as sills for houses and beams for bridges, among the most liable to decay, and the most costly to replace, some other and cheaper treatment is required, and for this the French plan of causing solutions of metallic salts to be carried through the wood, either by the natural flow of the sap while the trees are standing, or by gravity when the trunks are felled and laid with their bases higher than their tops, appears preferable to any other. For shingles and small wood-work, where the thinness of the stuff permits its facile permeation throughout, simple boiling in a properly constituted solution ought to furnish an effective safeguard against decay. As thus indicated, no one system of wood preserving can be profitably applied to all purposes, but the treatment must vary with the size of the timber and the use to which it is to be put. In this division of the subject into specialties lie abundant opportunities for improvement, which, once made, will give a much wider range of usefulness to the much talked about, but little adopted, practice of preserving timber.

WIND-POWER.

WHERE, as with land-and-sea breezes, a more or less uniform wind can be counted upon, windmills are of very great utility, and give good results even in their rudest and cheapest forms; but in localities where these conditions do not obtain their use is limited, and must remain so until some more efficient method of accumulating power from their irregular action, to be given out regularly and under perfect control, is provided. Such appliances, and many different ones, have been suggested, but they render the construction of the apparatus more complex, costly, and liable to get out of order, and except for machines of moderate power, say of one or two horses, it is doubtful if they possess much chance of general adoption. But in agricultural districts especially, windmills no more powerful than this would prove of very great use for many purposes, and the most feasible means of improving them up to a practical standard are worthy of attention.

Under the great variations in the velocity of the wind in most regions of this country, any governing device operating merely to open the sails to a light wind, and *vice versa*, will achieve but little, and perhaps as much has already been done in this direction as is likely to be of use. Aside from this, recourse must be had to some method of accumulating force when the wind is strong, to be given out to aid the work when the propelling power becomes weak. To provide this, some projectors have arranged mechanism whereby, in the one case, cast-iron balls were raised, to be allowed, in the other, to act as descending weights, acting to assist the revolutions of the windmill shaft. Still another plan has been to pump water to an elevation, whence, when needed, it descended to a turbine or water engine gearing with the shaft of the prime mover. But what seems most plausible of all is provided by causing the windmill to force air into a reservoir, whence, under compression, it may be conducted to a suitable engine, and used in the same manner as steam or other elastic vapor. Of course the heat evolved from the air by compression would be just so much power lost, but as the whole source of supply, the wind, would be useless without some apparatus for controlling its application to industrial uses, this objection amounts practically to very little.

DESICCATING VEGETABLES.

THE great area of farming land, the fertility of the soil, and the extent to which labor-saving machinery has been applied in all the operations of tillage and harvesting, have combined, in this country, to cheapen the production of all kinds of provender and forage, and have led practically to the neglect of many processes theoretically possessed of much utility. Some of those finding favor abroad can hardly find any permanent use here, owing to the different conditions imposed by climate, etc.; an example of these being found in the suggested method of drying grain in the sheaf by artificial heat, capable possibly of profitable employment in the moist summer of England, but useless under the dry and often scorching suns of our American harvest season. Other foreign projects having the same aim of utilizing cattle feed in a higher degree than is now done are not subject to the same disadvantages, and of these few or none are apparently more feasible than the production of something more than mere succulent feed from the heavy yield averaged by roots such as carrots, mangolds, and the like.

A recent English experiment in this line suggests the advantages resulting from the feeding of kiln-dried in lieu of raw mangolds. Eight tuns of the roots were pulped by machinery and placed in a kiln, where, after twenty-four hours, the whole was reduced to one tun of dry material. Eight hundredweight of this was fed to five sheep during twenty weeks, the animals meanwhile being confined to one and one-half acres of poor grass-land. The result showed an increase in the weight of the animals, over and above that ordinarily derived from the feeding of an equivalent quantity of raw roots, of more than two hundred and fifty per cent. The desiccated roots may of course be used in a measure as a substitute for grain, commonly fed to supply the lack of nutriment in straw and haulm, and for which, in any notable degree, green or raw roots are insufficient from their excessively watery character.

For drying vegetables, the most feasible method is to subject them, in thin slices, to the action of currents of heated air, and this is the practice adopted in certain establishments in New Jersey and Delaware, where the desiccation of fruits and vegetables for table use is carried on. In these a steam-coil is arranged within a cylindrical chamber, so connected with a fan that an air-blast can be rapidly driven through it into the drying-room. This latter is furnished with frames bottomed with wire-gauze, upon which the materials to be dried are placed, and carried by endless chains, to which an intermittent traveling motion is given. The air as it leaves the coil, at a temperature of from 160° to 170°, comes in contact with the material in its most watery condition, but the latter, by the movement of the frames, is exposed toward the close of the operation to a heat commonly not greater than 120°.

But in any attempt to carry into practice the ideas suggested, more care will be required than at first appears needful, and especially should be avoided any reliance upon the cheap apparatus used for drying hops, etc., a brief trial of which for fruit or vegetable drying will, as we know by actual trial, result in failure. Moreover, it must be remembered that for cattle feed the dried product must come in direct competition with the most abundant of the cereals, and better established data than are at present available are needful before the probable profit can be even approximately estimated. But it is different with reference to table products, and in the preparation of these the desiccation of succulent edibles seems to afford a good opportunity both for promising experiments and for business enterprise.

LITHOFRACTEUR.

WHILE accident upon accident of the most terrible character has demonstrated the extreme danger attending the transportation and use of unmixed nitro glycerine, the small proportion of accidents occurring in the use of explosive mixtures containing this substance proves that these mixtures, though by far more effective than gunpowder, are nearly or quite as safe. The amount of force suddenly liberated by the combustion of dynamite or lithofracteur is almost inconceivable, and the effects produced are astonishing even to those long accustomed to them.

There remains, however, a fear in the popular mind that anything containing nitro-glycerine is nearly as dangerous as the pure article. These fears are, however, groundless. The use of no explosive is absolutely free from danger, but dynamite and lithofracteur may be handled and used without the excessive caution so necessary, yet so difficult to maintain, in the employment of nitroglycerine alone.

In proof of this, we have constantly accumulating evidence, among the most important of which are experiments made with lithofracteur at Shrewsbury, England, in the quarries near that place.

In 1869, an act was passed prohibiting, under severe penalties, the manufacture, storage, transportation, or use, in England, of not only nitroglycerine, but of any compound into which it enters as an ingredient, except when a license is obtained from the Home Secretary.

The terms of the license were such, however, that the act really amounted to almost positive prohibition. It was with a view to obtain a modification of the law that the experiments under consideration were instituted, and their results communicated to the Home Secretary.

The question of safety being the one to be settled by the experiments, experiments to show the great power of the explosive were made entirely secondary.

To determine the effect of high temperatures upon lithofracteur, a portion was placed in a cup heated by an oil-bath. At a temperature of 374° Fahr., the lithofracteur smoldered away, without explosion or even flame.

Effect of concussion was tested by pounding the explosive between wood and wood, stone and iron, and iron and iron. The lithofracteur spread out as paste or putty would, but could not be made to explode. A deal box containing five pounds of lithofracteur was thrown down on to a stone ledge from the height of one hundred and fifty feet. The box was dashed to pieces, and the cartridges scattered without explosion.

Five pounds were placed in a deal box, and put in the center of a heap of straw, which was fired. The box burned away, and, the flames reaching the explosive, the latter burned quietly, without even the slightest sign of explosion. The same amount being placed in a box, the latter was placed in a hole in a rock, covered with an iron plate, and stones heaped thereon. A Bickford mining fuse without a cap was used to ignite the lithofracteur, which burned quietly, as in the previous experiment. The box when examined was only slightly charred, showing the low temperature generated by the material when burned in this way. These results indicate the effect of heat on lithofracteur when burned in an inclosed space, and it may fairly be inferred from them that a magazine containing this material might be burned to the ground without an explosion occurring.

When exploded with Bickford fuse and a cap, the disruptive and crushing effect of the explosion was manifested in the demolition of stockades, so constructed as to demonstrate the wonderful destructive power of the lithofracteur when fired in this manner.

A series of experiments to demonstrate the safety of lithofracteur under extreme circumstances of railroad collision was then performed. These experiments are thus described in *Engineering*, Feb. 23:—

"A wagon weighing 1½ tuns, with wooden buffers, was first fixed at the bottom of Mr. Frances's railway incline, which is 500 yards long, and has a gradient of 1 in 8. On each of the front buffers were tied three cartridges of lithofracteur, whilst on those of a wagon at the top of an incline were tied two more. Two cartridges were tied on the rails about half-way down the incline, and two were smeared on the rails 30 yards lower down. On the upper wagon being released, it rushed down the incline, exploding one of the tied cartridges on its way, and fairly hitting the buffers of the lower wagon, and scattering the cartridges in all directions, without exploding them. The experiment was then repeated with iron-faced buffers. The upper wagon, in its downward course, did not explode either of the cartridges on the rails, but, on contact with the lower wagon, those on the buffers were exploded, as was expected, when contact was made between iron and iron. At the desire of the committee, the experiment was repeated with one pair of wooden and one pair of iron-plated buffers. Upon the descending wagon reaching within a short distance of the lower one, a wheel broke, and the wagon toppled over into the other, without a fair collision of the buffers. No explosion, however, occurred, and the lithofracteur was found upon the ground."

These results show that the popular fear of nitro-glycerine compounds has no good foundation in fact, and that the great benefits attending their use in blasting are not likely to be offset by serious accidents.

COMMISSIONER'S DECISIONS.

JOHN D. WILBER AND HENRY VELIE—

Ex parte.

[*Appeal from the Board of Examiners-in-Chief in the matter of the application of John D. Wilber and Henry Velie for Letters-Patent for* IMPROVEMENT IN MOWERS.—*Decided April 17, 1872.*]

The substitution of a ball-and-socket joint for a loose bolt-joint in the adjustable arm of a cutter-bar is but the substitution of one well-known joint for another, requiring no change or adaptation in the joint substituted, and involves no invention.

A claim for a *joint* in a cutter-bar, in combination with the *shoe* or with the *bevel-wheels*, is not good, inasmuch as the latter perform exactly the same functions in the same manner, whether the cutter be jointed or otherwise.

A specific new feature should not be combined in a claim with parts which have no necessary connection therewith, and whose operation is not immediately affected by the presence or absence of the said novel feature.

A having patented a machine, and B having patented certain improvements thereon, it is not allowable for A, by another application, to cover the use of B's improvements in connection with the specific features of his own (A's) original patent.

LEGGETT, *Commissioner*:—

The invention in this case relates to direct-draught front-cutting mowers; and consists of such an arrangement of joints as to enable the cutter-bar to follow the surface of the ground, however that may differ, for the time being, from the line of the axle of the driving-wheels. The

pplication was rejected, on reference to Markhams' patent of March 7, 1871.

February 10, 1863, John D. Wilber, one of the pplicants in this case, obtained a patent for a ront-cutting direct-draught mower having the utter-bar directly in front of the driving-wheels nd the draught so arranged as to have one of the orses travel in the standing grass. The frame eing rigid, the cutter-bar was always held in a ine parallel to the axle connecting the driving-wheels, and, consequently, would not do good work on uneven ground. Nothing, however, was done to overcome this defect until H. C. & D. C. Markham obtained their patent, March 7, 1871.

Markhams' specification sets out in terms that it is an improvement upon John D. Wilber's machine. Markhams' improvement consisted in placing a joint in the left side arm that would admit of a free vertical motion of the right end of the cutter-bar, and in the right side arm two joints, one near the axle, that would permit the right end of the cutter-bar to move freely in the arc of two separate circles, and the other at the point of attachment of the right arm to the cutter-bar, permitting free vertical motion. The sole object of this invention was to secure such flexibility in the arms as to permit the cutter-bar to follow the surface of uneven ground.

The applicants in this case, feeling injured because the Markhams should patent an improvement on their machine, come into the office eight months after with an invention to secure exactly the same thing, with three joints located in exactly the same places, and two of the joints of exactly the same kind. In place of Markhams' loose-bolt joint at the rear of the right arm, Wilber and Velie substitute the ball-and-socket joint. It is possible that the ball-and-socket joint is the better of the two; but, whether it is or not, it is only substituting one well-known joint for another, requiring no change or adaptation in the joints substituted, and therefore can involve no invention. The motion required at this joint is very little, and it is doubtful whether the ball-and-socket has any advantages over the form adopted by Markhams. For the uses to which they are here applied they are substantially equivalents, each for the other, and one being patented, the other should not be.

The applicants present these combination claims, in which they claim each one of the joints, in combination with the shoes, the cutter-bar, the lead-wheels, etc. These combination claims in mowers and reapers have been carried to a ridiculous extent, and should be curtailed. The shoes, lead-wheels, etc., have no more to do with the invention in this case than have the shoes of the teamster or the wheels of the hay-cart. The shoes and the lead-wheels and the cutter-bar perform exactly the same duties in exactly the same way in both the old and the improved machine. The sole purpose of the invention was to secure flexibility in the arms that carry the cutter-bar. This end having been secured by Markhams' invention, it is ridiculously absurd to suppose that applicants can now rob Markhams of their invention by patenting the only combination in which it is possible to use it. Markhams distinctly state in their application that they omit in their model and drawings all those parts of the mower not essential to illustrate their invention; but also state that the invention is intended to improve the Wilber mower, or, as it is better known, the "Eureka" mower—in other words, they substitute in the "Eureka" mower flexible arms for Wilber's rigid arms; and now Wilber and Velie seek to obtain a patent for the combination of Markhams' improvement with their mower, which is exactly what Markhams have already done.

The decision of the board of appeals is affirmed.

Electric Earthquakes.

A FRANTIC scientist has discovered at last the cause of California's shocking earthquakes. It is all the fault of the mineral belts constituting the slopes of the Sierra Nevada. Iron predominates in all these belts, and as iron is the most obliging conductor of electricity, they become in the dry season immense reservoirs of confined negative electricity. Dry air being a non-conductor, all this force gets no chance for equalization with the air current, hence, when it becomes crowded, it bursts out with tremendous impetuosity. To check this agitating performance, our savant advises the use of iron conductors. The trembling Californians listen kindly, and lonely horsemen, winding down the great hills of the Sierra Nevada range, may presently prepare to see them surrounded by an expensive and bristling fence of lightning-rods.

Crystallization in Wrought-iron.

MR. ROBERT STEPHENSON was unable to satisfy himself from a large experience that any such molecular change in fibrous iron took place, and referred to the beam of a Cornish engine, which, working eight or ten strokes a minute for more than twenty years, under a strain of 50 lbs. per inch, and the connecting-rod of a locomotive, vibrating eight times a second for several years of regular work, making more than 200,000,000 times, yet remained uninjured; and he considers these facts good grounds for doubting that iron changes its state in axles. Many engineers have doubted that any axle which, when broken, proved to be crystalline had ever been fibrous in its character. Others maintain that the change does not take place unless the iron is strained beyond its limit of elasticity. One of the most striking examples of the change is shown in the chain slings used for carrying the bars during the process of hammering at a forge, and also to the porter bars attached to the blooms while under the hammer, both of which are known to become very brittle after a few months. Mr. Thorneycroft (England) considered that the internal structure of iron undergoes no change unless there be a change of form; that simple vibration will not destroy the fiber, whereas bending, if long continued, would change the most fibrous iron to crystalline. Mr. Roebling states that the most fibrous bar may be broken so as to show a granular and somewhat crystalline fracture, and this without undergoing any molecular change in the texture. "Take," he says, "a fibrous bar, say 10 feet long, nip it in the center all around with a cold chisel, then poise the bar upon the short edge of a large anvil and a short piece of iron placed eight or nine inches from the edge on the face of the anvil, and strike a few heavy blows upon the nip so that each blow will cause the bar to rebound and to vibrate intensely, and the result will be a granular and somewhat crystalline fracture. Now take up the two halves and nip them all around again, about one or two inches from the fractured ends, and break them off by easy blows over the *round* edge of the anvil, and the fiber will appear again. This experiment proves that a break caused by sudden jars and intense vibration may show a granular and even crystalline fracture, without having changed the molecular arrangement of the iron. All fibers are composed of mineral crystals drawn out and elongated or flattened, and the fracture may be produced so as to exhibit in the same bar, and within the same inch of bar, either more fiber or more crystal. But a coarse crystalline bar will under no circumstances exhibit fiber, nor will a well-worked out fiber exhibit coarse crystals." Mr. Roebling concludes that a molecular change, or so-called granulation or crystallization, in consequence of vibration or tension, or both combined, has in no instance been satisfactorily proved or demonstrated by experiments; but that vibration and tension combined will greatly affect the strength of iron *without* changing its fibrous texture, and that this loss of strength bears a due proportion to the extent and duration of the vibration and tension.—*Exchange.*

American Iron Product.

American pig-iron manufacturers made two millions of tuns last year, worth at least sixty millions of dollars. It is estimated that one hundred thousand men, supporting families numbering at least half a million persons, were employed in constructing or altering furnaces, opening mines, digging and transporting ore, coal, and limestone, cutting timber and burning charcoal, and from these materials smelting pig-iron. Add those who build or furnish dwellings, grow food, and make clothes for these iron-makers, and not less than one million of our people draw their subsistence from this industry.

Canadian Fisheries.

THE annual report of the Minister of Marine and Fisheries of Canada, lately submitted to Parliament, shows the general condition of the fisheries under the Dominion during the past year, especially in Nova Scotia. The actual value of the produce of the fisheries for the purpose of trade is $85,732,000, being an excess over that of the preceding year of $998,160. It is estimated that the quantity consumed for domestic use is $600,090 worth. The amount of capital thus engaged is estimated at $15,000,000. The number of persons employed is about 87,000.

WARMING RAILWAY CARRIAGES.—The *Cologne Gazette* gives some particulars in reference to the new method for heating the railway carriages in Germany. The new combustible is coal, prepared by a chemical process similar to that in use for heating carriage feet-warmers, but having further the value of drawing out more heat and burning a greater length of time. Four pieces of coal 5 inches long, 4 inches wide, and 1 inch thick, are sufficient to warm a compartment for twelve hours. The coal burns in copper boxes placed under the seats, or even under the flooring. The air required to produce combustion is conducted through pipes, also placed under the carriages, and a similar contrivance is used to get rid of the gas. This arrangement prevents the escape of fresh air and the introduction of foul air. Several railway companies are making a trial of this system, which the *Cologne Gazette* hopes to see established next year for the third and fourth classes, as well as for the first and second.

SCHUYLER'S PAPER PAIL.—In our list, for present week, of important patents will be found that of the paper pail invented by Mr. P. C Schuyler, illustrated on page 264, current volume of our journal, and manufactured by the American Papier-maché Company, whose offices are at No. 1 Barclay Street, New York City, and not No. 29, as previously erroneously stated.

NEW AMERICAN PATENTS.

UNDER this head we shall give a weekly summary of the more important American and English Patents.

UNIVERSAL JOINT COUPLING FOR CONNECTING SHAFTS.—M' Clemens, Boston, Mass.—*April* 23; ante-dated *April* 6.—This comprises a ball-and-socket joint, adapted to be self-oiled from an oil reservoir within the ball. Also, a peculiar construction of the hollow ball-and-socket joint for the described apparatus and for other similar purposes. Also, a self-oiling pivot-pin with bushings, constructed and adapted together for such apparatus, and also a secondary self-oiling pivot-pin used in conjunction therewith.

FIRE-ENGINE.—C. Cleveland, New York City, and W. C. Cleveland, Ithaca, N. Y.—*April* 23.—This improved fire-engine consists of air and water pumps, connecting by means of tubes with an atomizing apparatus, constituted by a hollow trunk opening into a water-jacket surrounding a perforated tube, and an air blast-pipe directed through a second or open tube. A peculiar arrangement of parts forming the atomizing apparatus is also included in the claim.

APPARATUS FOR BLEACHING, DYEING, AND FINISHING TEXTILE FABRICS.—J. Lea, Philadelphia, Pa., and J. Eberhardt, Conshohocken, Pa.—*April* 23.—Among the more noticeable features of this improvement is a process of mordanting and dyeing by applying the coloring matters or mordants in a vaporous state to the cloth or fabrics treated. Also, a process of bleaching by applying the solution for scouring or chemicing in a vaporous state, to the cloth or fabric. Also, a process of finishing by applying the starching, glazing, or other sizing matters in a vaporous state to the cloth or fabric. Also, a process of washing cloth or other fabrics, by the application thereto of hot or cold water in a vaporous or divided state.

PERMUTATION LOCK.—O. E. Pillard, New Britain, Conn.—*April* 23.—This inventor claims two or more permutation locks, in combination with an intermediate mechanism that operates to disconnect all communication between the bolt of one of the said locks and its tumblers. Also, the use of pins and tumblers of such length as to pass each other in combination with a loose washer having an arm which makes nearly a complete revolution between the pins, thus necessitating an extra revolution in setting the tumblers as required in the more effective operation of the device.

STEAM-GENERATOR.—D. Renshaw, Syracuse, N. Y.—*April* 23.—This apparatus is constituted by the combination of a reverberatory furnace, a steam-drum placed outside of the said furnace, a horizontal pipe and flat disk, or equivalent shaped sections, each connecting to the steam-drum and horizontal pipe, and having all its surfaces upon which the contained water rests, and upon which sediment can form or deposit, inclined downwardly toward the horizontal pipe, the whole being arranged for joint operation for the usual purposes of a steam-generator.

UNISON-STOP FOR PRINTING TELEGRAPHS.—M. F. Wessman, Brooklyn, N. Y.—*April* 23.—The most prominent characteristic of this device is found in a unison mechanism for printing telegraph instruments brought directly into action by the movement of a single cog or projection on the type-wheel shaft.

APPARATUS FOR THE MANUFACTURE OF GAS FROM PETROLEUM.—H. H. Edgerton, Fort Wayne, Ind.—*April* 23.—This invention embraces, in the manufacture of gas, the vaporization of volatile hydrocarbons before they enter the gas retort or retorts, by means of a jacketed pipe or pipes communicating with such retort or retorts. Also, the separation of liquids of different gravities in a continuously flowing stream, and before entering the vaporizer by means of unequal column discharges. Also, an apparatus for separating and vaporizing volatile hydrocarbon liquids organized and operating on the principles just specified.

APPARATUS FOR SEPARATING AND COLLECTING YEAST FROM THE FROTH OF FERMENTING TANKS.—C. Fleischmann, Cincinnati, Ohio.—*April* 23.—In this apparatus is used a reciprocating sieve separator, operating in connection with suitable vessels for delivering the froth or scum thrown off in the fermentation of grain, and receiving the pure yeast, in such a way as to separate the gluten and albumen, or nitrogenized substance of the grain constituting the pure yeast aforesaid, from the husks or other refuse matter.

LAMP FOR BURNING HEAVY OILS.—R. Hitchcock, Watertown, N. Y.—*April* 23.—This is a lamp for burning heavy oils in which the wick-tube or holder and oil reservoir is combined, with conduits or passages for conducting air both to the interior and exterior of the flame, mechanism for forcibly impelling air through said passages, and a deflector or cone. Among other adjunctive features of the improvement may be mentioned the use of an auxiliary oil reservoir, arranged above and communicating with the main reservoir by which the flame is supplied.

TYPE-WRITING MACHINE.—H. R. M. J. Hansen, Copenhagen, Denmark.—*April* 23.—This invention is constituted by the combination of converging types circularly disposed, and a paper-carrying surface arranged in appropriate relation thereto, so that the point toward which the types converged shall coincide with the point where the impressions are made. The invention also includes the combination of the types, and the paper-carrying surface which is operated by a coiled spring, or its equivalent, with an insulated cap, electro-magnet, and escapement, essential in the proper working of the apparatus.

HUBS FOR VEHICLE-WHEELS.—S. B. Hitt and R. W. Chapman, Waterloo, Iowa.—*April* 23.—This improvement embraces a hub-band having staggering spoke-sockets, the sockets being connected at their bases, and separate and projecting at their outer end, and having shoulders on the inside. Among other features are also claimed the combination of a band having the outer ends of the sockets separate and projecting, spokes having shoulders, and a mortised wooden hub.

INKSTAND.—T. J. Mayall, Boston, Mass.—*April* 23.—This device is formed by a combined cap, ink-tube, and elastic diaphragm made of soft rubber, molded and vulcanized in one piece, and adapted for application to the ink-reservoir. There is also claimed the combination, with the cap provided with ink-tube and diaphragm, of an ink reservoir provided with a screw-threaded or equivalently formed neck, and transverse channels or grooves for the escape of air while the cap is being applied to the reservoir.

HOISTING MACHINE.—W. Neal, Louisville, Ky.—*April* 23.—Aside from minor points of construction, the essential feature of novelty in this machine lies in the employment of hoisting drums of different diameters, keyed to the same shaft, and each carrying an end of the rope, wound in opposite directions, so that one end of the rope is wound while the other is unwound, in combination with a suitably arranged pivoted cross-piece.

CAR-COUPLING.—C. Whitus, Philadelphia, Pa.—*April* 23.—The more important characteristic of this car-coupling is found in the arrangement of a counterpoise with open bearings at the bottom of the draw-head over an aperture formed for it in said bottom so that it can be employed to hold the coupling-link at the required elevation or angle, when adjusted for coupling cars of different heights or cars standing on curves, and so as to leave the draw-head space clear when the act of coupling is completed.

BEE-HIVE.—S. O. Higgason, Union City, Tenn.—*April* 23.—This improvement embraces a novel arrangement of a chamber and honey-box, so that by the mere movement of the honey-box backward and forward, the passages from the broad chamber to the honey-box may be shut off.

SEWING-MACHINE.—C. W. Howard, Philadelphia, Pa.—*April* 23.—The salient point of this improvement exists in a vibrating arm having thread-guiding eyes, a tension disk, and a needle-bar, provided also with thread-guiding eyes, all so arranged in relation to each other that the arm at the commencement of its descent will draw from the disk just enough thread to form a stitch.

RAILWAY-CAR WHEEL.—F. M. Ray, Jun., New York City, executor, etc., of F. M. Ray, Sen., Boston, Mass.—*April* 23.—This new car-wheel is made in two parts, completely isolated from each other by a double-flanged contiguous ring of rubber, compressed to a density at which it is always retained, part of said contiguous flanged ring being forced by a projection on the tire, into a recess in the hub, and the whole constituting an improved article of manufacture, in which all the strains to which the spring is subjected, namely, direct radical strains, lateral strains, and torsion, are resisted by a part of the aforesaid rubber ring.

PAPER PAIL.—P. C. Schuyler, New York City.—*April* 30.—Heretofore in the manufacture of water-pails and other like vessels of paper, it has water been customary to make the bottoms separate from the sides, and afterwards to unite the bottom and sides of such a vessel in various ways. This is very objectionable, inasmuch as the bottoms soon give out or separate at the joint formed at the union of the bottom with the sides; but it has not been found practicable by the trade heretofore to produce a paper pail, in which the entire body, or bottom and sides, is in one piece, without break or joint. This invention consists in a combination with the paper body of a false bottom and metallic band, constructed to receive and hold the false bottom, to brace the sides of the pail, and to form a bearing surface for the latter, whereby the pail is materially strengthened and protected from injury, and in combination therewith of a peculiarly constructed top band for stiffening the sides of the pail and serving to receive the lid within it; also, to form a broad bearing surface for the lid as well as to protect the upper edges of the body of the pail.

MECHANICAL MOVEMENT.—A. M. White, Bridgeport, Conn.—*April* 30.—This invention consists in certain novel features or elements that, combined, constitute a new or improved mechanical movement for transmitting motion from a primary revolving wheel or driver to another wheel or any number of wheels in succession, arranged side by side on the same shaft or axis, and deriving regular progressive motions in successive order, one from the other, at intermittent periods, said wheels, or cylinders, as they may be termed, being hollow and containing the mechanism by which motion is communicated from one to the other within them, and forming, among other purposes or uses, a convenient arrangement of cylinders for counting devices, or indicators applicable to meters and other purposes.

WASHER-CUTTER.—E. S. Hidden, Milburn, N. J.—*April* 30.—This invention relates to hollow punches, either single or double, designed for cutting washers and other articles. The invention consists in the combination with such a punch having a reciprocating motion of a stationary discharger, occupying the circular space within a single punch, or the circular space within the inner of two punches forming a double punch, and the annular space between the two, whereby the cut articles are automatically discharged from the punch by the retraction of the latter after each cutting operation.

PENHOLDER TIP.—D. M. Somers, Brooklyn, N. Y.—Ap 30.—This invention relates to what are known as barrel-t penholder tips, and consists in the novel construction of su a tip of a single piece of sheet-metal, whereby its cost is red ed partly by the reduction of the number of machines and chanical manipulations necessary for its production, and p ly by its being enabled, without detriment to its efficiency durability, to be made of a quality of metal inferior to wh necessary for the manufacture of its two barrels separat from separate pieces of metal, and whereby also greater ness of the butt and security of the nip are obtained.

OFFICIAL LIST OF PATENTS

ISSUED FROM THE UNITED STAT PATENT OFFICE

For the Week ending April 30, 1872,

AND EACH BEARING THAT DATE.

[*Reported officially for the "American Artisan."*]

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126,128.—WASHING MACHINE.—E. Carter, Troy, N. Y.

126,129.—GRAIN-BINDER.—E. H. Clinton, Iowa City, Iowa.

126,130.—CARRIAGE-TOP.—H. M. Colton, Southbridge, Mass. Ante-dated April 20, 1872.

126,131.—SAFE.—W. Corliss, Providence, R. I.

126,132.—SAFE.—W. Corliss, Providence, R. I.

126,133.—SAFE.—W. Corliss, Providence, R. I.

126,134.—SAFE.—W. Corliss, Providence, R. I.

126,135.—DOG-COLLAR.—P. Daly and J. Barry, Boston, Mass.

126,136.—CAR-COUPLING.—J. Dinsmore, Dinsmore Station, Pa. asgr. of one-half of his right to J. Lee, New Lisbon, Ohio.

126,137.—DEVICE FOR CUTTING OFF TUBES.—W. H. Downing, asgr. of one-half his right to B. Masseth, Shamburg, Pa.

126,138.—GATHERED HEM.—H. A. Ellis, asgr. to W. Brown, Chicopee Falls, Mass.

126,139.—HEMMER.—H. A. Ellis, asgr. to H. Comstock, Chicopee Falls, Mass.

126,140.—REST FOR SUPPORTING GLASS BOWLS UNDERNEATH HORIZONTAL GAS-BURNERS.—S. Gardner, asgr. to J. H. Darlington, New York City.

126,141.—BELT-PUNCH.—J. E. Gates, Lowell, Mass.

126,142.—WATER-COLOR PAINT.—M. J. Green, Boston, Mass.

126,143.—MILLSTONE DRIVER.—W. A. Gustine, Ipava, Ill.

126,144.—VEGETABLE-GRATER.—T. W. Houchin, Morrisania, N. Y.

126,145.—HITCHING-STRAP.—B. Hunter, Philadelphia, Pa.

126,146.—FLOATING DOCK.—S. Janicki, St. Petersburg, Russia.

126,147.—PLANTER AND CULTIVATOR.—A. Little, Jamestown, Ohio.

126,148.—PRESERVING MEAT AND VEGETABLES.—A. S. Lyman, New York City.

126,149.—WATCH-CASE SPRING.—P. Maret, Belleville, Ill.

126,150.—MANUFACTURE OF BLIND-HINGE HOOKS.—W. H. McIntosh, Needham Upper Falls, Mass.

126,151.—LETTER-BOX.—E. Mill and S. L. Chubbuck, Cleveland, Ohio.

126,152.—KNEE-BRACE FOR SEWING-MACHINES.—F. E. Mills, New York City, asgr. to "Mills's Treadle Manufacturing Company," San Francisco, Cal. Ante-dated April 18, 1872.

126,153.—SUPPORTING WAGON BODIES UPON RUBBER SPRINGS.—W. A. Nichols, Zionsville, Ind.

126,154.—DEVICE FOR SOFTENING COMB-BLANKS.—W. Noyes and H. W. Noyes, Newburyport, Mass.

126,155.—EARTH-CLOSET.—G. W. Roberts and J. H. Graham, Wilmington, Del. Ante-dated April 10, 1872.

126,156.—CULTIVATOR.—James Rue, Englishtown, N. J.

126,157.—BAG-TIE.—T. H. Russell, Lebanon, N. H., asgr. to himself and H. C. Mahurin, New York City. Ante-dated April 11, 1872.

126,158.—PETROLEUM FORGE OR BLOW-PIPE.—H. S. Saroni, Cincinnati, Ohio. Ante-dated April 10, 1872.

126,159.—MACHINE FOR FEEDING AND INSERTING RIVETS IN BOOTS AND SHOES.—G. V. Sheffield, Boston, Mass., asgr. to S. S. Cook, Woonsocket, R. I.

126,160.—TOOL FOR GRINDING LATHE-CENTRES.—D. Slate, Hartford, Conn.

126,161.—PIPE-WRENCH.—D. C. Stillson, Charlestown, Mass.

126,162.—MACHINE FOR BOLTING LATHS.—J. M. Stowell, Milwaukee, Wis.

126,163.—STEAM-BOILER FOR HEATING BY HOT AIR AND STEAM.—D. Sullivan, Bangor, Me.

126,164.—BUSTLE.—G. R. Taber, Boston, Mass. Ante-dated April 20, 1872.

126,165.—CULTIVATOR.—Z. Toms and L. W. McMullan, Hertford, N. C.

6,166.—Preparation of Artificial Skins with Natural Hair.—J. R. Tussaud and F. C. Tussaud, 58 Baker Street, Portman Square, Eng.

6,167.—Fence.—J. H. Van Dorn, Akron, Ohio.

6,168.—Propulsion of Boats.—L. H. Watson, Pittsburg, asgr. of two-thirds of his right to S. W. Gates and J. S. Hunter, Philadelphia, Pa.

6,169.—Machine for feeding Plates to Shearing Machines.—F. Westwood, asgr. to himself and G. H. Westwood, South Wheeling, W. Va.

6,170.—Bolt-threading Machine.—S. H. Wright, Lowell, Mass.

6,171.—Wood Pavement.—W. W. Ballard, Elmira, N. Y.

6,172.—Knife-cleaner.—J. T. Barnstead, Peabody, Mass.

26,173.—Clothes-wringer.—E. G. W. Bartlett, asgr. to The Providence Tool Co., Providence, R. I.

26,174.—Base-plate for Artificial Teeth.—J. A. Bidwell, Toledo, Ohio.

26,175.—Railway Rail.—J. L. Booth, Rochester, N. Y.

26,176.—Shutter-fastener.—F. X. Brenner, Philadelphia, Pa.

26,177.—Wagon Platform.—I. Bronson, Lockport, N. Y.

26,178.—Excavating Machine.—D. Brown, Southampton, asgr. of one-half his right to E. C. Silliman, Peoria, Ill.

26,179.—Metal-cutting Machine.—A. S. Bunker, Lawrence, Mass.

126,180.—Fly-trap.—P. A. Burgess, Butler, Mo.

126,181.—Neck-yoke for Wagons.—T. Byrd, Jun., and I. Byrd, Williamsville, Mich.

126,182.—Valve.—R. B. Chapman, Waltham, and E. F. Spaulding, Cambridgeport, Mass., asgr. to R. B. Chapman.

126,183.—Coupling for Shafting.—J. Charlton, Philadelphia, Pa.

126,184.—Lamp Chimney and Burner.—M. H. Collins, Chelsea, Mass.

126,185.—Combined Cooking-stove and Water-heater.—C. Comstock, New Canaan, Conn.

126,186.—Harrow.—W. J. Cordill, Blue Earth City, Minn.

126,187.—Manure-distributer.—D. E. Cripe, Pyrmont, Ind.

126,188.—Machine for welding Plow-irons.—C. G. Cross, asgr. to C. Furst and D. Bradley, Chicago, Ill.

126,189.—Carbureter.—J. R. Cross, New York City, asgr. to J. P. Burton, Massillon, Ohio.

126,190.—Shoe.—S. C. Crowe, Cambridgeport, Mass.

126,191.—Gate-latch.—B. F. Dickey, Marshall, Mich.

126,192.—Machine for making Cop-tubes.—R. Douglas, asgr. to himself and J. Douglass, Lowell, Mass.

126,193.—Tree and Plant Protector.—W. F. Eaton, Cape Elizabeth (Portland Post-office), Me.

126,194.—Cotton-press.—G. Falkner, Warrenton, N. C.

126,195.—Enameling and coating Articles with Rubber, Gutta-percha, etc.—P. Finley, New York City.

126,196.—Apparatus for amalgamating Precious Metals.—E. J. Fraser, San Francisco, Cal.

126,197.—Stave Machine.—L. R. Fulda, asgr. to himself, M. Fulda, and H. C. Fulda, San Francisco, Cal.

126,198.—Molding and Carving Machine.—A. S. Gear, Boston, Mass.

126,199.—Spool-holder.—J. B. Gibbs, asgr. to himself and J. N. White, New York City. Ante-dated April 16, 1872.

126,200.—Pestle for hulling Coffee, Rice, etc.—J. Guardiola, Chocolá, Guatemala.

126,201.—Wagon-brake.—H. G. Hadden, Jun., Catskill, N. Y.

126,202.—Non-freezing Hydrant, etc.—J. H. Hall, Peoria, Ill.

126,203.—Roraty Engine.—D. D. Hardy and A. C. West, Delavan, Ill.

126,204.—Canal-boat.—H. J. Hatch, Chicago, Ill.

126,205.—Pegging Machine.—O. G. Healy, asgr. to J. E. Bickford and M. Cook, Jun., Abington, Mass.

126,206.—Peg for Shoes.—O. G. Healy, asgr. to J. E. Bickford and M. Cook, Jun., Abington, Mass.

126,207.—Machine for cutting Cloth.—A. Heller, New York City.

126,208.—Railway Car-brake.—J. C. Hosmer, asgr. to himself and J. A. Robertson, Boston, Mass.

126,209.—Thill-coupling.—S. Hubbell, Jun., West Salem, Ohio.

126,210.—Water-wheel.—M. Hungerford, San Francisco, Cal.

126,211.—Washing Machine.—J. W. Hunt, Liberty, Mo.

126,212.—Preparing Horse-radish for Use.—J. D. Husbands, Jun., St. Louis, Mo.

126,213.—Lap-board.—W. M. Ireland and C. Andrews, Washington, D. C.

126,214.—Flexible Side for Bellows.—A. F. Jones, New York City.

126,215.—Wagon-tire Tightener.—J. Kafader, Jacksonville, Oregon.

126,216.—Sash-holder.—E. U. Kinsey, asgr. of one-half of his right to W. N. Kip, Passaic, N. J.

126,217.—Corset-spring Fastener.—E. Kunze, Buchholz, Saxony.

126,218.—Blinder for Horses.—R. Lehmicke, Stillwater, Minn.

126,219.—Painter's Brush-holder.—J. Lemoine, Winchendon, Mass.

126,220.—Pitman Connection for Harvesters.—W. Loucks, Lowville, N. Y.

126,221.—Hoof-shear.—M. C. Malone, Palmyra, Ill.

126,222.—Hoisting Apparatus.—L. S. Mason, Middlefield Center, N. Y.

126,223.—Lock-nut.—J. A. Morrison, asgr. to himself and G. H. Morrison, Parker's Landing, Pa.

126,224.—Attaching Rubber Eraser to Lead-pencils.—T. H. Müller, Yonkers, N. Y.

126,225.—Tracking Attachment for Vehicle-shafts.—J. B. Negly, Fairview, Ill.

126,226.—Bedstead.—S. Oberholzer, Wheaton, Ill.

126,227.—Fly-frame for Printing-presses.—A. Overend, Philadelphia, Pa., asgr. to R. Hoe & Co., New York City.

126,228.—Attaching Blanket to Printing-cylinders.—A. Overend, Philadelphia, Pa., asgr. to R. Hoe & Co., New York City.

126,229.—Bee-feeder.—E. J. Peck, Linden, N. J. Ante-dated April 13, 1872.

126,230.—Joint for Core-spindles.—W. F. Perkins, Boston, Mass.

126,231.—Bit for Safety-bridles.—S. S. Petersheim (Groff's Store P. O.), Upper Leacock Township, Pa.

126,232.—Machine for making Saw-handles.—E. S. Piper, Rochester, N. Y.

126,233.—Wash-boiler.—N. L. Rigby, Chetopah, Kan.

126,234.—Spark-arrester.—Augusta M. Rodgers, Brooklyn, N. Y.

126,235.—Self-facing Check-valve.—C. Rue and J. H. Knight, Doylestown, Pa.

126,236.—Cutting Apparatus for Harvesters.—J. S. Schoonover and P. S. Bacon, Corry, Pa. Ante-dated April 13, 1872.

126,237.—Preparing Moss for Ornamental Baskets.—J. W. Shiveley, Saratoga Springs, N. Y.

126,238.—Sewing-machine for Boots and Shoes.—M. J. Stein, New York City.

126,239.—Cattle-poke.—O. Sweet and C. H. Sweet, South Glenn's Falls, N. Y.

126,240.—Building-yard.—A. W. Thompson, New York City.

126,241.—Sliding Center-light Extension Gasalier.—S. B. H. Vance, asgr. to Mitchell, Vance & Co., New York City.

126,242.—Gold for Dental Purposes.—R. S. Williams, New York City.

126,243.—Hedge-trimmer.—C. W. Aikin, Decatur, Ill.

126,244.—Cider Mill.—W. Aikin and W. W. Drummond, Louisville, Ky.

126,245.—Fire-kindler.—W. Altick, Dayton, Ohio.

126,246.—Steam Water-elevator.—W. Arthur, Newport, Ky.

126,247.—Steam-pressure Gauge.—E. H. Ashcroft, Lynn, Mass.

126,248.—Lock for Doors.—J. R. Baker, Jersey City, N. J.

126,249.—Water-bucket.—C. Ballinger, Buchanan, Pa.

126,250.—Planter and Fertilizer.—M. Barbour, Oxford, Ohio.

126,251.—Electric Torch for lighting Gas.—W. W. Batchelder, New York City.

126,252.—Die for forging Carriage Shackle-eyes.—H. M. Beecher, Plantsville, Conn.

126,253.—Carving-dish.—E. P. Bernard, New York City.

126,254.—Hanging Lamp.—G. Bohner, Chicago, Ill.

126,255.—Wheel-plow.—A. J. Borland, Donaldson, Iowa.

126,256.—Hat and Clothes Hook.—T. Bowerman, Newark, N. J.

126,257.—Chute and Fish-way.—J. D. Brewer, Muncy, Pa.

126,258.—Combined Planter and Cultivator.—T. M. Brooks and J. Brooks, Cincinnati, Ohio.

126,259.—Card-holder.—B. Brower, New York City.

126,260.—Ruler.—B. Brower, New York City.

126,261.—Lubricating Loose Pulley.—I. F. Brown, New London, Conn.

126,262.—Type-setting Machine.—O. L. Brown, Boston, Mass.

126,263.—Electrical-alarm Apparatus for Bank-safes.—W. H. Butler and D. D. Parmelee, New York City.

126,264.—Machine for deseaming Cloth.—T. E. Chase, Boston, Mass.

126,265.—Canceled.

126,266.—Folding-lounge.—W. B. Coates, Philadelphia, Pa.

126,267.—Method of raising Liquid from Barrels.—E. Cook, Rochester, N. Y.

126,268.—Pull for Water-closet Levers.—H. H. Craigie, New York City.

126,269.—Valve for Water-raising Apparatus.—H. H. Craigie, New York City.

126,270.—Water-closet Valve.—H. H. Craigie, New York City.

126,271.—Automatically-closing Waste-trap.—J. Daniels, Washington, D. C.

126,272.—Box.—R. B. Davis, New York City.

126,273.—Andiron.—J. T. Dee and I. Murray, Fredericktown, Mo.

126,274.—Lubricator for Steam-engines.—R. W. Deely, asgr. of one-half his right to A. Sampson, Richmond, Ind.

126,275.—Manufacture of Sulphide of Sodium.—A. K. Eaton, asgr. to himself, A. Mann, and W. Mann, Brooklyn, N. Y.

126,276.—Cultivator.—G. Fawcett, Farmington, Ill.

126,277.—Apparatus for preparing Anthracene.—H. J. Fenner, Greenwich, and F. Versmann, London, England.

126,278.—Hub for Vehicles.—C. W. Fillmore, Marengo, Ill.

126,279.—Wagon-hound.—J. Fishbaugh, Tiffin, Ohio.

126,280.—Car-wheel.—A. C. Fletcher, New York City.

126,281.—Whiffletree-hook.—S. J. Foreman, asgr. to himself, J. S. Weeks, and Z. Omans, Nottawa (Mendon P. O.), Mich.

126,282.—Lubricating Compound.—Bridget French, Rochester, N. Y.

126,283.—Treating Cereal Grains for Mashing.—C. H. Frings, asgr. to himself and C. Braches, Central, Mo. Ante-dated April 20, 1872.

126,284.—Mechanical Movement.—L. Goodall, Deering, N. H.

126,285.—Furnace-grate.—R. C. Graves, Barnesville, Ohio.

126,286.—Lifting-jack.—W. H. Greenwalt, Strickersville, Pa.

126,287.—Electro-magnetic Alarm.—W. B. Guernsey, Jersey City, N. J.

126,288.—Electro-magnetic Burglar-alarm.—W. B. Guernsey, Jersey City, N. J.

126,289.—Electrical Lining for Safes, Vaults, etc.—W. B. Guernsey, Jersey City, N. J.

126,290.—Telegraph.—W. B. Guernsey, Jersey City, N. J.

126,291.—Brick Machine.—F. L. Hall, Oneida, N. Y.

126,292.—Automatic-fan.—W. De L. Hall, Memphis, Tenn.

126,293.—Process of treating Sugar-cane Leaves, etc., for obtaining Fibrous Materials.—T. Harang, Banana Grove Plantation, La.

126,294.—Fire and Burglar Alarms.—W. Henckler, Kirkwood, Mo.

126,295.—Cutter for cutting Washers.—E. S. Hidden, Milburn, N. J.

126,296.—Ash-sifter.—J. S. Holcomb, Syracuse, N. Y.

126,297.—Artificial Stone.—J. W. Hopkins, Fayetteville, N. C.

126,298.—Car-rack.—T. S. Hudson, Cambridge, Mass.

126,299.—Hanger for Railway Cars.—T. S. Hudson, Cambridge, Mass.

126,300.—Apparatus for extracting Oil from Vegetable and other Matters.—E. S. Hutchinson, Baltimore, Md.

126,301.—Machine for lining Pasteboard.—G. L. Jaeger, New York City.

126,302.—Glass-cutter.—P. Jennet, Meadville, Pa.

126,303.—Water-cooler.—R. S. Jennings, Philadelphia, Pa.

126,304.—Safety-valve.—H. S. Jewell and F. Steele, Brooklyn, N. Y.

126,305.—Ice Machine.—W. R. Johnston, Sedalia, Mo., and W. Whitelaw, asgrs. to themselves and J. Johnson, Memphis, Tenn.

126,306.—Rotary Pump.—D. L. Jones, Nebraska City, Neb.

126,307.—Machine for marking Carpenters' Squares.—H. K. Jones, asgr. to Hart Manufacturing Co., Kensington, Conn.

126,308.—Enameling Jewelry and other Articles.—G. Krebs, New York City.

126,309.—Washing Machine.—J. La Burt, asgr. of one-half his right to Kate Leopold, New York City.

126,310.—Railway Switch.—W. E. Lewis, Cleveland, Ohio.

126,311.—Manufacture of Artificial Stone.—O. Loew, asgr. to J. Anderson, New York City.

126,312.—Flour-bolt Knocker.—E. B. Lowe, asgr. of one-half his right to A. M. Gregg, Bellefontaine, Ohio.

126,313.—Shifting Carriage-top.—O. E. Mallory, Batavia, N. Y.

126,314.—Horse Hay-rake.—R. H. Martindale, Hobbville, Ind.

126,315.—Machine for coiling Wire spirally.—T. J. Mayall, Boston, Mass.

126,316.—Envelope.—W. F. McCrary, Baker City, Oregon.

126,317.—Adjustable Pitmen for Washing Machines.—A. McGinnes and B. J. Carter, Lancaster, Pa.

126,318.—Potter's Lathe.—H. B. Morris, Burlington, N. J.

126,319.—Loom.—R. Mueller, asgr. to himself and E. Greeff, New York City.

126,320.—Cotton-planter.—J. H. Nale, asgr. of one-half his right to C. Collins, Memphis, Tenn.

126,321.—Cheese-vat.—W. H. Obitts, Elyria, Ohio.

126,322.—Chair.—C. M. O'Hara, Hillsborough, Ohio.

126,323.—Iron Building and Roof.—C. H. Parker, Boston, Mass.

126,324.—Washing Machine.—L. Parre, Mendota, Ill.

126,325.—Reversible Filter.—J. D. Parrot, asgr. to himself and H. McCauley, Morristown, N. J.

126,326.—Bridle for Horses.—M. A. Penn, Sumter, S. C.

126,327.—Device for operating Car-ventilators.—G. W. Perry, Wilmington, Del.

126,328.—Door-check.—S. Peters, and C. D. Eisaman, Penn Station, Pa.

126,329.—Printing Telegraph.—G. M. Phelps, asgr. to Western Union Telegraph Company, Brooklyn (E. D.), N. Y.

126,330.—Automatic Relief-valve.—J. E. Prunty, Baltimore, Md.

126,331.—Machine for cutting Splints.—C. E. Ramus, Lawrence, Kansas.

126,332.—Bobbin for Sewing-machine Shuttles.—T. Reeve, Brooklyn, N. Y.

126,333.—Corn-grater.—G. C. Rickards, Jun., asgr. to himself and W. Allen, Philadelphia, Pa.

126,334.—Carpet-fastener.—J. W. Saumenig, Baltimore, Md.

126,335.—Paper Pail.—P. C. Schuyler, New York City.

126,336.—Printing Telegraph.—G. B. Scott, Brooklyn, N. Y., asgr. to himself and A. G. Davis, Baltimore, Md.

126,337.—Machine for treating Fibrous Plants.—W. B. Shedd, asgr. of one-half his right to W. C. Fay and S. B. Howe, Boston, Mass.

126,338.—Towel-crane.—R. A. Smith, East Weare, N. H.

126,339.—Pen-holder.—D. M. Somers, Brooklyn, N. Y.

126,340.—Tobacco Pail or Chest.—J. Steele, Sheldon, Ill.

126,341.—Mill for crushing Sugar-cane, etc.—H. B. Stevens, asgr. to G. L. Squier, Buffalo, N. Y.

126,342.—Reach for Wagon.—C. Stöhr and H. Sackmann, New York City.

126,343.—Railroad Car-heater.—G. F. Stone, Baltimore, Md. Ante-dated April 18, 1872.

126,344.—Car-coupling.—G. F. Stone, Baltimore, Md. Ante-dated April 17, 1872.

126,345.—Lantern.—C. J. Sykes, Chicago, Ill.

126,346.—Jack-head.—N. Thelen, Schenectady, N. Y.

126,347.—Fire-kindler.—D. W. Thompson, St. Joseph, Mo.

126,348.—Inkstand.—W. C. Tilden, Washington, D. C.

126,349.—Lubricator for Car-axle Boxes.—S. Ustick, Philadelphia, Pa.

126,350.—Lubricator for Car-axle Boxes.—S. Ustick, Philadelphia, Pa.

126,351.—Lubricator for Car-axle Boxes.—S. Ustick, Philadelphia, Pa.

126,352.—Car-axle Lubricator.—S. Ustick, Philadelphia, Pa.

126,353.—Printing-telegraph.—H. Van Hoevenbergh, Brooklyn, N. Y.

126,354.—Pipe-mold.—E. Walsh, Rochester, N. Y.

126,355.—Reversible Rotary Engine.—W. H. Ward, Auburn, N. Y.

126,356.—Collecting Electricity for Telegraphing, etc.—W. H. Ward, Auburn, N. Y.

126,357.—Machine for dividing Plate-metal along Curved or Straight Lines.—N. Waterman and A. T. Perkins, Toledo, Ohio.

126,358.—Warper.—W. Welch, Woonsocket, R. I., asgr. to Hopedale Machine Co., Hopedale, Mass.

126,359.—Washing Machine.—S. Werntz, asgr. of one-half of his right to C. H. Hartman, Strasburg, Pa.

126,360.—Combined Key-hole Guard and Door-securer.—G. Wheeler, New Springville, N. Y.

126,361.—Counting-register.—A. M. White, Bridgeport, Conn., asgr. to the Fairchild Water-meter Co., New York City.

126,362.—Fence.—R. H. White, Billingsville, Ind.

126,363.—Medical Compound or Eye-wash.—H. Whiteley, Pittsburg, Pa.

126,364.—Harness Saddle-tree.—P. H. Wiedersum, asgr. to the Wiedersum Manufacturing Co., New York City.

126,365.—Umbrella.—E. Wight, Philadelphia, Pa.

126,366.—Wood Screw.—E. S. Wills, Philadelphia, Pa.

126,367.—Advertising Device.—I. B. Ziegler, asgr. to M. B. Ziegler, Philadelphia, Pa.

RE-ISSUES.

4,883.—Hame for Harness.—W. H. Bustin, Boston, Mass. Patent No. 89,288, dated April 27, 1869.

4,884.—Needle.—G. C. Cooper, asgr., by mesne-assignments, to C. W. Clifford, Thompsonville, Conn. Patent No. 149, dated Jan. 22, 1861.

4,885.—Molding Machine.—A. S. Gear, Boston, Mass. Paten No. 97,188, dated Nov. 23, 1869.

4,886.—Wood-molding Machine.—A. S. Gear, Boston, Mass. Patent No. 106,685, dated Aug. 23, 1870.

4,887.—Hydrant.—W. Race, Lockport, N. Y., and S. R. C. Mathews, Philadelphia, Pa.; said Race asgr. to said Mathews. Patent No. 19,206, dated Jan. 26, 1858; re-issue No. 4,475, dated July 18, 1871; extended seven years.

DESIGNS.

5,819.—Cooking-range.—J. Beesley, asgr. to C. Noble & Co., Philadelphia, Pa.

5,820.—Broom-handles.—J. Dion, Chicago, Ill.

5,821.—Car-linings, etc.—C. Husband, Taunton, Mass.

5,822.—Hat and Clothes Rack.—I. H. Kinch, Pleasantville, N. Y.

5,823 to 5,825.—Carpet-pattern.—A. M. King, asgr. to H. J. Dixon & Sons, Kidderminster, England.

5,826.—Soda-water Apparatus.—C. Lippincott, asgr. to C. Lippincott & Co., Philadelphia, Pa.

5,827.—Revolving Picture-case.—R. R. Marsh, Detroit, Mich.

5,828.—Carpet-pattern.—C. T. Meyers, Lyon's Farms, N. J., asgr. to E. C. Sampson, New York City.

5,829.—Floor Oil-cloth Pattern.—J. Meyer, asgr. to Deborah Powers, A. E. Powers, and N. B. Powers, Lansingburg, N. J.

5,830.—Garden-chair.—(Case F.)—W. Mushet and R. Mushet, Dalkeith, Scotland, asgrs. to J. L. Mott, Mott Haven, N. Y.

5,831.—Garden-chair.—(Case G.)—W. Mushet and R. Mushet, Dalkeith, Scotland, asgrs. to J. L. Mott, Mott Haven, N. Y.

5,832.—Garden-chair.—(Case D.)—W. Mushet and R. Mushet, Dalkeith, Scotland, asgrs. to J. L. Mott, Mott Haven, N. Y.

5,833.—Jewel or Silver-ware Box.—G. Schoenemann, New York City.

5,834.—Military Cap.—J. Schuller, Brooklyn, N. Y.

5,835.—Badge.—T. W. Sweney, Reading, Pa.

5,836.—Front and Strike Plates for Locks.—G. W. White, New York City, asgr. to P. and F. Corbin, New Britain, Conn.

TRADE-MARKS.

790.—Mustard and Spices.—G. S. Adams, New York City.

791.—Horse-blankets.—S. W. Baker, Providence, R. I.

792.—Twines, Yarns, Shoe-threads, etc.—Cable Flax Mills, Schaghticoke, N. Y.

793.—Baking and Roasting Apparatus.—T. J. T. Cummings, Fort Wayne, Ind.

794.—Cattle Food.—G. Gordon, New York City and Montreal, Canada.

795.—Pianos.—Ohio Valley Piano Company, Ripley, Ohio.

796.—Silverware.—Rogers & Bro., Waterbury, Conn.

797.—Medicine.—N. Smith, Syracuse, N. Y.

798.—Ice.—Swett & Crouch, Chicago, Ill.

EXTENSIONS.

19,979.—Sewing-machine.—C. F. Bosworth. April 20, 1858.

19,984.—Cooling and drying Meal.—J. Deuchfield. April 20, 1858; re-issued Jan. 16, 1872. No. 4,712.

APPLICATIONS FOR EXTENSIONS.

Opponents of extensions must file *written* objections in the Patent Office at least 20 days before the day-of-hearing; and on that day, at noon, they must appear personally, or by proxy, at the Patent Office, and state the reasons of their opposition. All testimony—*pro* or *con*—must be taken and transmitted in accordance with the official rules, which will be furnished on application. The under-named patentees have recently petitioned for extensions (for seven years) of patents granted to them in the year 1858:—

Isaac P. Carrier, Ashburnham, Mass.—*Rocking-chair.*—Patented July 13, 1858; testimony will close on June 25, next; last day for filing arguments and examiner's report, July 5; day-of-hearing, July 10.

B. F. Trimmer, Rochester, N. Y.—*Grain-separator.*—Patented July 27, 1858; and re-issued Sept. 29, 1868; testimony will close on June 25, next; last day for filing arguments and examiner's report, July 5; day-of-hearing, July 10.

Ivers Gibbs, Worcester, Mass.—*Stock for holding the Cutters in Rotary Planing Machines.*—Patented July 27, 1858; testimony will close on June 25, next; last day for filing arguments and examiner's report, July 5; day-of-hearing, July 10.

Azel Storrs Lyman, New York City.—*Separating the Fibres of Wood.*—Patented August 3, 1858; testimony will close on July 2, next; last day for filing arguments and examiner's report, July 12; day-of-hearing, July 17.

ENGLISH PATENT JOURNAL.

LIST OF APPLICATIONS FOR PATENTS ON WHICH Provisional Protections HAVE BEEN OBTAINED IN ENGLAND BY OR FOR AMERICAN INVENTORS.

[*This list is condensed weekly from the "Journal of the British Commissioners of Patents," expressly for the* "American Artisan."]

3,474.—Manufacture of ice.—A. C. Twining, New Haven, Conn.—Dec. 22, 1871.

390.—Making gloves, etc.—James Harrison, Chicago, Ill.—Feb. 7, 1872.

995.—Packing for steam-engines, etc.—G. Gwynn, New York City, G. Gilbert, and C. Barnes, Brooklyn, N. Y.—April 4, 1872.

1,002.—Utilizing the butts, etc., of railway rails.—H. Chisholm, Cleveland, Ohio.—April 5, 1872.

1,011.—Construction of railways, etc.—J. Frye, New York City.—April 5, 1872.

1,048.—Loom for weaving.—J. Short, New Brunswick, N. J.—April 8, 1872.

1,051.—Treatment of animal, etc., substances.—W. Adamson, Philadelphia, Pa.—April 9, 1872.

1,053.—Lining rotary puddling furnaces.—S. Danks, Cincinnati, Ohio.—April 9, 1872.

1,055.—Tuyeres.—C. H. Baker, Philadelphia, Pa.—April 10, 1872.

1,058.—Spring motive power.—J. McComb, New Orleans, La., and F. M. Mahan, Memphis, Tenn.—April 10, 1872.

1,061.—Postal card.—E. McClintock, Milwaukee, Wis.—April 10, 1872.

1,064.—Manufacture of sieves.—R. J. Mann, Burlington, Iowa.—April 11, 1872.

ANSWERS TO CORRESPONDENTS.

J. L., of Mo.—[1] Rosin is used in the manufacture of all cheap yellow soaps. When not in too great proportion, it renders the cleansing action of the soap more energetic, and also renders it fit to be used in washing with sea-water, etc. [2] You can make an ammonical soap by mixing and shaking one drachm of ammonia, at 22°, with one ounce of sweet almonds.

M. O. S., of Md.—The following mixture is much used by fishermen for making leather waterproof:—One pound beeswax, half-pound rosin, and half-pound suet, incorporated together by melting.

G. R., of N. J.—You had better go for information to some one practically conversant with the business to which your inquiry relates. We can say in general that for making smooth cut-nails, not liable to split, a cold short iron is much better than a fibrous iron, especially if the latter be coarse.

E. H., of Conn.—Your idea of communicating a noiseless motion to self-rocking cradles is new to us, but the mechanism seems to us too complex for such an apparatus. Quite possibly there may be other uses for the invention to which this remark will not apply.

L. S. N., of N. Y.—Our suggestion that a machine for separating heavy from light grain for seed might be constructed on the plan of an ore-separator was made in good faith. Of course a separator in which water is used as an agent is inadmissible, but an intermittent air-blast or an application of centrifugal force would not be open to any objection that we know of.

METAL MARKET.

[*Corrected weekly for the "American Artisan."*]

New York City, Saturday, April 27, 1872.

COPPER.

Duty: Pig and Bar 5c. and Sheathing 4c. per lb.

American Ingot	$— 44	@	— 45
Sheathing, new (suits), per lb	— —	@	— 46
Sheathing, old	— —	@	— 36
Sheathing, yellow	— —	@	— 30
Pig, Chile	— —	@	— —
Bolts	— —	@	— 48

IRON.

Duty: Bars 1 @ 1½c. per lb.; R. R. 70c. per 100; Boiler and plate, 1½c. per lb.; Band, Hoop, and Scroll, 1¼ @ 2¾c. per lb.; Pig, $7 per tun; Sheet, 3c. per lb.

Pig, English and Scotch, per tun	$50 00	@	55 00
Pig, American	50 00	@	52 00
Bar, English and American	100 00	@	105 00
Bar, Swedish, assorted grades	85 00	@	100 00
Sheet, Russia, per lb	— —	@	— 18½
Sheet, Single, D. and T. Common	— 6	@	— 7

LEAD.

Duty: Pig, $2 per 100 lbs.; Pipe and Sheet, 2½c. per lb.

German, gold	$5 90	@	6 00
Spanish, gold	5 90	@	6 00
Bar, net	9 25	@	— —
Sheet and Pipe, net	10 00	@	— —

NAILS.

Duty: Cut, 1½; Wrought, 2½; Horseshoe, 5 cents per lb.

Cut, per 100 lbs	$— —	@	6 50
Clinch	7 25	@	7 75

SHOT.

Duty: 2¼c. per lb.

Drop and Pk. (cash) per lb	— —	@	— 10½
Buck, comp. (cash) per lb	— —	@	— 11½

SPELTER (Zinn).

Duty: In Pigs, Bars, and Plates, $1 50 per 100 lbs.

Plates, gold	$7 12½	@	7 31½
" dom	— 7	@	— 11

TIN (Zinn).

Duty: Pig, Bars, and Block, 15 per cent. ad val.; Plates and Sheets, 25 per cent. ad val.

Banca, cash, per lb., gold	$— —	@	— 52
Straits, gold	— 42	@	— 43½
English, gold	— 42	@	— 43½
Plates, I. C., cash	17 00	@	18 50
Plates, I. C	15 00	@	15 50

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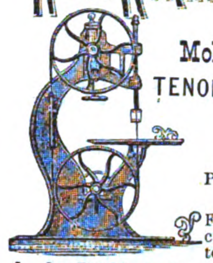

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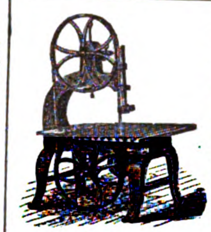

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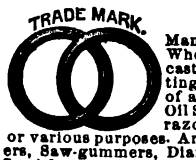

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None but ORIGINAL illustrations—preferably executed by *our own engravers*—will be published in the AMERICAN ARTISAN. Distant patentees desiring to have their inventions illustrated and described in our columns, should at once send us a small model of their machine, by express (prepaid); or mail a good photograph, together with their LETTERS-PATENT, to our address. We will then promptly examine the same, and return a reply, stating the precise expense of the engraving, the payment of which will be always required in *advance*. Address models, documents, etc., for the above object, as follows:—

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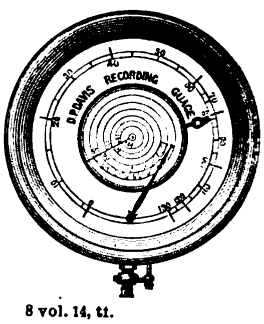

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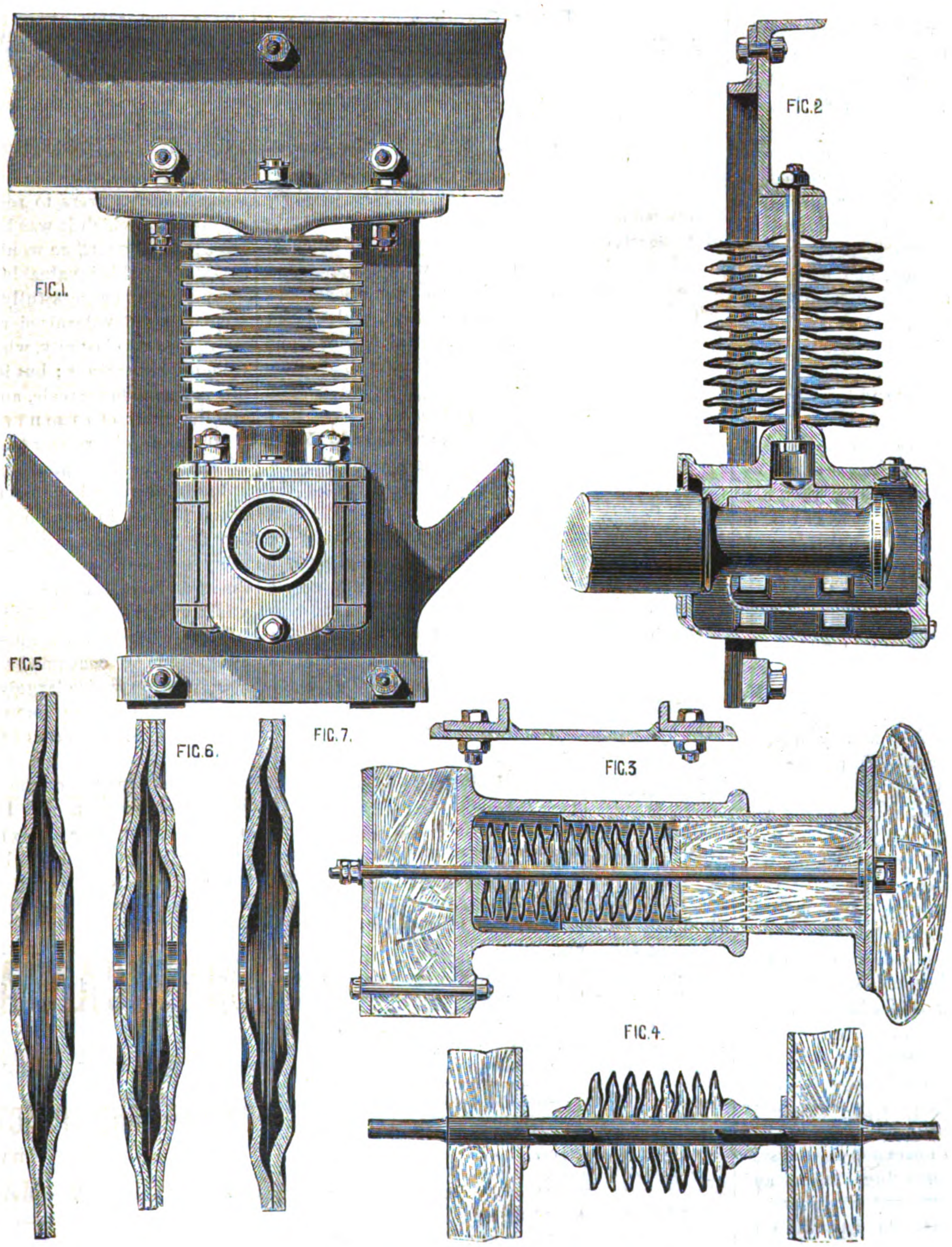
Corrugated Disk Car springs.

We give herewith engravings showing several pplications of forms of corrugated disk springs ately designed and atented in England y Mr. Alfred Egan, he engineer of the Theiss Railway in Pesth, Hungary. Mr. Egan's springs consist of a number of disks, each stamped in dies so as to give it a concave form, and at the same time to give it annular corrugations. Figs. 5, 6, and 7 show several sections of these disks, and the manner in which the latter can be applied is clearly shown by the other figures. We may remark, however, that it is not in all cases necessary to string the disks on a central rod, as they can be enclosed by a casing or between suitable guides. The disks may also be made of varying thickness, as, for instance, in Fig. 7, where they are thinned out towards the center to augment the elasticity. The disks of such springs as are at present already in use under railway wagons are about 8 inches in diameter. In another method the elasticity of the disks is heightened by rendering the several sets air-tight on the edges and forcing compressed air into them.



CORRUGATED DISK CAR-SPRINGS.

Mr. Egan's springs belong to the same class as the Belleville disk springs and the disk springs tried many years ago by Mr. William Brydges Adams. They possess, however, the distinctive feature of the annular corrugations; but in the absence of detailed particulars of the powers of resistance and elasticity of the springs, we cannot speak as to the influence of this feature. A number of the springs are, however, in use on Austrian railways, and it is stated they have stood severe tests satisfactorily. Their form evidently renders it possible to manufacture them at a very moderate cost, and the operation of changing or replacing the disks is very readily performed.

We may add our belief that there is still great room for invention in the matter of car-springs in general. There is nothing of this kind, so far as we know, that is not more or less defective in some respect. Whoever produces a spring equal to those in use may compete with the latter with fair success, as the demand for car-springs is very large; but whoever could succeed in producing something quite superior might with good business management count upon making a large fortune.

New Mode of Washing.

The ill effects of soda on linen have given rise to a new method of washing, which has been extensively adopted in Germany, and introduced into Belgium. The operation consists in dissolving two pounds of soap in about three gallons of water as hot as the hand can bear, and adding to this one tablespoonful of turpentine and three of liquid ammonia; the mixture must then be well stirred, and the linen steeped in it for two or three hours, taking care to cover up the vessel containing them as nearly hermetically as possible. The clothes are afterward washed out and rinsed in the usual way. The soap and water may be reheated, and used a second time, but in that case half a tablespoonful of turpentine and a tablespoonful of ammonia must be added. The process is said to cause a great economy of time, labor, and fuel. The linen scarcely suffers at all, as there is little necessity for rubbing, and its cleanliness and color are perfect. The ammonia and turpentine, although their detersive action is great, have no injurious effect upon the linen; and while the former evaporates immediately, the

smell of the latter is said to disappear entirely during the drying of the clothes.

The Advance in the Price of Iron.

THE recent great rise in the price of iron is exciting much fear that those vast enterprises which are a feature of the age will, if they do not receive a permanent check, be so retarded as to mutually affect their financial future. On this subject the Boston *Commercial Bulletin* makes the following timely remarks :—

The rapidly increasing demand for and consumption of this metal, in its various manufactured forms, has already been brought to a halt, and enterprises of great public utility, and even of national importance, are now awaiting further developments upon this subject.

This enhanced cost falls with the most severe and paralyzing effect upon railroad building enterprises, and hence indirectly upon the general interests of commerce and production, so largely dependent upon transportation facilities. Unfortunately this large advance has come upon us at a time when the railroad system of the country is being extended at the rate of some seven or eight thousand miles a year, when new building projects were about to be entered upon in nearly every State and Territory in the Union, and when vast railroad schemes were being matured in South America, Russia, Egypt, India, China, and other non-producing countries, which have just begun to develop their material resources, and need iron to do it with in immense quantities and in every possible utilized shape.

At the present ratio of increased consumption, in this country, on the score of railroads alone, we should want rails enough to lay fifty thousand miles of additional track during the next five or six years, to say nothing of the requirement of iron for rolling-stock, machinery, and industries dependent upon or growing out of this increase of railroads.

Where is all this iron coming from? and if the *present* demand so much exceeds the supply, and forces up prices to so high a range, what may be expected of the *prospective* demand, which promises to be much larger in proportion than any prospective, or even possible, increase of production? With all the old markets of the world asking for a greater supply of iron products, and new ones constantly opening, can we reasonably hope to meet this demand upon a basis of values which will enable consumers to take and pay for what they want? The alternatives presented in this case are very plain and positive; either production must be enlarged, or consumption curtailed, since the present relations of supply and demand cannot be long continued without rendering iron a luxury rather than a necessity.

It is difficult to perceive how the increased supply, requisite to keep prices within bounds, can come from Europe, who just now seems to require about all she can make for her own use, and has every year less and less to spare for the outside markets of the world. The growing scarcity and high prices of coal and ore, the enhanced rates of miners' wages, and the reduced hours of labor in Wales and Scotland, are significant facts, which all point to a limited export movement and a high range of prices in the future. It is very evident that the cost of production there is not likely to be reduced, with mines growing deeper and more difficult to work, and operatives clamoring for more pay or deserting for other fields of labor.

But some of these reasons do not apply in this country; and it really seems that, with our abundant supply of coal and ore, lying close to the surface, and so easily mined and brought together, we ought not only to be able to supply our own domestic wants, but those of nearly all the world. To be sure, we have the same, and even a greater, difficulty to deal with on the score of high-priced labor and capital. But this is largely counterbalanced by peculiar advantages; and, though we cannot expect to produce and manufacture iron as cheaply as Europeans for some years to come, we can increase our production almost indefinitely. And this we shall probably do in the near future, since the business is now sufficiently remunerative to warrant large investments of capital, and a ready market awaits the iron-master on every hand.

Paper Clothing.

AN English inventor is said to have produced a really serviceable paper fabric. It is a mixture of various animal and vegetable substances, the former being wool, silk, and skins; the latter, flax, jute, hemp, and cotton. These articles are all reduced to a fine pulp, bleached, and then felted by means of machinery. The mixture of these several substances produces a fabric claimed to be of wonderful flexibility and strength, so much so that it can be sewed together with a machine as are woven fabrics, and make as strong a seam.

This paper can be made into table-cloths, napkins, handkerchiefs, pants, curtains, shirts, and other articles of dress. The petticoats made from it are said to be of elaborate design and wonderful beauty. The United States *Economist* says they are either printed or stamped, and bear so close a resemblance to linen or cotton goods of like description as almost to defy the scrutiny of the ablest experts. The stamped open-work skirts display a delicacy of pattern that it would be almost impossible to imitate by any ordinary skill with the needle. Imitation blankets, and chintz for beds, furniture, or curtains, are also made very cheaply. Embossed table-cloths and figured napkins made of felted paper so closely resemble the genuine damask linen as to be palmed off upon the unsuspecting as the genuine article.

In Germany, paper napkins have been used for several years. Their cost is but a trifle, and they pay for themselves before they require to be cast aside. Felted paper is capable of being made into lace, fringe, and trimming; and for these several purposes it is unequaled in point of cheapness and durability. Imitation leather is also made from the same material, which is also impervious to water. It is soft and pliable, and is a useful fabric for covering furniture, making into shoes, for belts, and many other purposes. In China and Japan, paper clothing has long been worn by the inhabitants. It is very cheaply produced there, a good paper coat costing only ten cents, while the expense of an entire suit is limited to twenty-five cents.

An Invention Wanted.

THE *Scientific Press* calls upon some genius to overcome a difficulty that exists in the African diamond fields in the matter of properly crushing the matrix of the diamond. The earth in which they are found is a whitish cement-like formation, which is easily reduced to a powder by a blow. It occurs in pockets of considerable superficial area which are scattered about at short distances apart all over the country. These deposits are enclosed in slaty rocks which sometimes "crop out."

The method of mining is by sinking a shaft as far as pay dirt is found, and some of the shafts have been sunk as deep as seventy feet. The cement is raised and carried to a sorting table, where it is pulverized by hand, by means of wooden mallets, care being taken not to injure the diamond in the operation. This pulverized material is spread out and scanned carefully for the precious gems, and the miner may consider himself fortunate if he finds one small one in a week. Sharp-sighted men have the best chance.

An invention needed is a machine by which this cement can be crushed to not less than one thirty-second of an inch in size, and that can be run by horse-power or hand. It must also effect the object desired without injury to the diamonds contained in the cement. The cement is a little more adhesive than dried mortar. The other invention wanted is a separating machine which shall require no water and at the same time be reliable. The river diggings are said to be exhausted and the present fields are dry. Here is a chance for some inventor.

Old Rubber.

A FORTUNE awaits the happy inventor who shall teach manufacturers to restore old rubber to the condition in which it was before vulcanization, for, with that secret, there would be practically *no consumption* of this invaluable article. The thing has been done, and successfully, and we have ourselves seen pieces of vulcanized rubber, possessing great strength and elasticity, which were made entirely from old car-springs; but it has never been accomplished on a large scale, and awaits the enterprise and ingenuity of some new Goodyear to develop it.

Meantime, old rubber has its uses. By a system of steaming and passing between rollers, it is reduced to a semi-plastic state, and in this condition is used in combination with a coarse fabric for heel stiffening, a purpose to which it is admirably adapted, its water-proof qualities being of especial value. There is in a neighboring city a factory devoted entirely to this branch of manufacture, where several hundred tuns of old rubber of all kinds are consumed annually.

Old rubber is also largely used to mix with new raw material in the manufacture of all kinds of rubber goods. It serves to give bulk and weight, and, if it does not increase, it certainly does not lessen the strength of the fabric. It may also be mentioned that powdered soapstone, white-lead, terra alba, and other heavy substances enter largely into the composition of almost all rubber goods, the use of which becomes apparent when it is remembered that they are generally sold by weight.

The Adulteration of Wax.

A METHOD of detecting the adulteration of wax with tallow by means of alcohol is described by Dr. Hardy, in the *Journal de Pharmacie et Chemie*. He first prepared pure beef-suet, and carefully determined the specific gravity of this substance, which he found to be 0·8863; next he prepared an alcoholic fluid of such a degree of concentration that a piece of the suet alluded to remained suspended (that is to say, sunk therein to a certain depth, and then remained at rest) in it. This alcohol was found to have a specific gravity of from 0·8882 to 0·8857 (between 71° and 72°); the specific gravity of wax is between 0·962 and 0·963; hence it follows that alcohol at 29° will keep wax suspended. Starting from these data, Dr. Hardy constructed a tabulated form, by the aid of which it becomes possible to detect adulterations of wax with suet (tallow).

Another Rotary Puddler.

ROTARY puddling furnaces are now much in favor among projectors, and the following sketch is descriptive of the latest, the subject of an English patent, that has come to our notice:—"The invention belongs to that class of mechanical puddlers in which the process is effected by revolving the chamber or vessel which contains the iron to be operated upon, and consists essentially in delivering the flame into and discharging the products of combustion from one and the same end of a revolving puddling-vessel. This vessel has its axis substantially horizontal, and is provided with a single opening, through which the flame and products of combustion enter and leave the chamber in the direction of its axis, flues being combined therewith for that purpose. This revolving puddling-vessel is supported on a traversing frame, which by preference vibrates through an arc of a circle on a vertical axis, the axis of the vessel being tangential to the arc of vibration of the frame, which frame is capable of both vertical and horizontal adjustment, the object being to enable the vessel to be swung round so as to bring its charging mouth into a convenient position for charging or discharging the same. This traversing supporting-frame serves also to carry the mechanism by which the puddling-vessel is rotated on its axis, the power required being transmitted through the vertical axis of the traversing frame. It is preferred to make the revolving puddling-vessel of a spherical form, with a large mouth or circular opening, and it is provided on its exterior with a series of bosses or projections opposite the opening, so arranged as to serve for securing a worm-wheel to the vessel. To this worm-wheel a hollow trunnion is attached, which supports the vessel at that end. The object of the bosses and hollow trunnion is to provide for a circulation of air, which will prevent the overheating of the journal.

A Locomotive Fire-engine.

THE Illinois Central Railroad have recently developed a novel fire-engine. Mr. S. J. Hayes, Superintendent of Machinery, with the aid of a Knowles force-pump, size "A," has turned out a locomotive which is a complete fire-engine on rails. This is to be kept fired up day and night, with two sets of hands. The force-pump is located on the top of the boiler, mid-way between the dome and the smoke-stack, and worked with steam from the locomotive. The tender, besides fuel, contains several hundred feet of supply and suction hose. Water will be obtained from hydrants, or from the lake, the latter being accessible by numerous side tracks. The cost of adding the force-pump to the locomotive was only about $700, while a steam fire-engine of equal power would cost nearly $3,000. Upon thorough testing it proves a complete success. The engineer and firemen are being drilled in their fire duties. With this engine always ready, the company will be less apprehensive of danger by fire. The yard-men, a number of whom are constantly on duty, will be drilled to "light up" hose, handle the pipe, etc.

This step, it is said, was prompted partly by the refusal of insurance companies to insure certain portions of the railroad company's property, but as much, perhaps, by a want of confidence on the part of the latter in the infallibility of the former, especially since the lessons taught by our recent great conflagration. At any rate, it is a wise precaution which provides means for quelling a fire in its incipiency, without relying upon and waiting for distant engines to come to the rescue.—*Railway Review.*

Promotion of Manufactures in Maine.

THE towns and cities of Maine are struggling one against the other in exhibitions of enterprise. Ever since Portland exempted the capital of new manufacturing establishments from local taxation for a term of ten years, the agitation has been spreading all over the State. The ball was set rolling there, and it has certainly not stopped since. The enterprise of Portland has been improved upon. Where Portland only exempted the capital of manufacturing enterprises for a term of ten years, some cities, eager to get ahead in the case, have come forward and voted to erect a large building, equip the same with steam-power, and then give it, rent and taxes free, for a term of ten years to any manufacturer who should be acceptable to the authorities.

Bethel came forward only a short time since, and offered these liberal inducements to manufacturers, and now there is still another. Buckfield, at a recent meeting, considered the proposition of a Stoneham shoe manufacturer to locate there, provided the town would exempt his factory from taxation for a term of ten years, and give him a factory and power rent free for a similar period, and after a short discussion the proposition was accepted. The building will be at once provided, and the town is guaranteed an annual product of $75,000 to $100,000 worth of goods.

Coal in England.

THE land-owners of Mid-England have been thrown into ecstasies by discovering veins of coal-iron. During the early part of the century, the North of England was the only important coal-field. Then the Staffordshire (midland) fields began to grow in importance. Coal is now worked over a large part of that county. In 1867 there were 117 collieries in operation in the north of that county, and 572 in South Staffordshire and Worcestershire. In that year these mines produced thirteen million tuns. In South Wales the increase in the production of coal has been yet more remarkable. Up to the beginning of this century, a Welsh squire was another name for a poor gentleman. It means something very different now. Coal "has changed all that." There are numbers of proprietors in Glamorganshire especially, where land has quintupled in value since 1825. That county now swarms with rich men. Nearly its whole surface rests upon coal strata, and mines are worked almost everywhere. There are now more than 250 collieries against 67 in 1856. It has been the abundant supply of coal and iron lying adjacent in this county that has made the Marquis of Bute, its principal land-owner, a millionaire. In 1866, 368,692 tuns of iron were raised here. At the Dowlais works there were in operation the same year 10 blast-furnaces, 150 puddling furnaces, and 13 rolling mills.

The most notable coal and iron finds of recent years have been in the midland counties of Nottingham and Northamptonshire. The yields in the former county have increased enormously since 1860. At the end of 1867 there were twenty-four collieries in operation, and the quantity obtained was 1,575,000 tuns. In some places the fortunate owners have been literally "coaled out" of their ancient manor-houses, being compelled to abandon what becomes the centre of a mining district. This happened to Lord Dartmouth, in Staffordshire, and seems likely to be the fate of many owners of great places. At Lambton Castle, the residence of Lord Durham, the foundations have been built up beneath with solid masonry, at an immense expense. Lord Fitzwilliam's magnificent seat near Rotheram, in Yorkshire, and Lord Mexborough's, near Leeds, have become the centres of a colliery system, and will probably, in another quarter of a century, be in anything but an agreeable neighborhood.

Quite recently a new coal-field has been opened in Nottinghamshire, about four miles from the great manufacturing borough of Nottingham. The late Sir Robert Clifton, in defiance of all mineralogical engineers, opened a shaft which is now yielding six hundred tuns a day, and a shaft at Hucknall Torkard—in whose little tumble-down church Byron's remains rest—sends up double that quantity daily. With such encouragement, it is not wonderful that Nottinghamshire land-owners are seized with a shaft-sinking mania. Meanwhile, we hope that neither tall chimneys nor indications of "puddling" will arise within view of Newstead Abbey. The present generation, at all events, need have no anxiety about the supply of coal, for it is pretty obvious that if one door shuts another opens. —*New York Times.*

The London Exposition.

THE second of the annual dispays of art and art manufactures will be made in London this year. These annual exhibitions differ from those which preceded them, inasmuch as the commissioners, instead of inviting contributions of all kinds of art-industry, select certain great classes of manufacture and exclude all besides. It is calculated that by this means each manufacturing interest will be fully exhibited once in every ten years. The fine arts, pictures, and sculpture are always represented; but the present year the great feature of the exhibition will be cotton in all its grades and modes of manufacture.

The Oxyhydric Light.

THE oxyhydric light has not proved a success in Paris, and it has been discontinued in the public lamps on the Boulevard des Italiens. It is not generally known that a carbureting apparatus is always employed in conjunction with the oxygen, which adds to the complication of the apparatus as well as the cost of the light. There are but few, remarks *Le Gaz*, who will consent to have installed in their houses two meters, two regulators, a carbureter, and two distinct systems of pipes. For this reason alone the system was certain to fail, even if the alleged economy were proved, which has never been the case.

Preparation of Wood Pulp.

C. DEMAILLY, of Lille, France, proposes to disaggregate textile plants and wood for paper-making and other purposes, by means of an apparatus described as follows:—

A sheet-iron or steel boiler closed at the top by a lid and capable of bearing a pressure of 20 atmospheres; the bottom receives the ends of semi-spiral pipes penetrating the interior a little below the level of the alkaline liquor, which immerses the wood or plants. The boiler is fixed in masonry in a particular manner, and combustion is induced by a jet of steam through a pipe and tap. The wood is cut into lengths and placed in a receiver, and the liquor is poured on, the strength varying from 8° to 10° Beaumé for wood, and 2 to 5 for other substances. The temperature is raised from 200° to 210° Centigrade in 2½ hours by the stove, and by pipes in which the alkaline caloric currents circulate continually. At the end the steam and liquor are evacuated by a cock; and after bleaching, the fibrous and textile matters are fit to be spun or made into paper.

TWITCHELL'S PATENT DRAFT REGULATOR.

THE engravings herewith presented, a perspective view and vertical transverse section respectively, illustrate an improved device designed to regulate the draft in stoves and ranges, and also to insure, to the greatest degree practicable, the utilization of the heat from the gaseous products of combustion. It was patented February 7, 1871, and it was claimed for it that, while by its use perfect control of the heat and the preservation of the fire during the night are provided for, an economy of one-third of the fuel is obtained.

The apparatus comprises two concentric sheet-iron shells filled in between with lumps of solid material, preferably with hard coal. There are two dampers suitably arranged, as indicated in the cut. When both of these dampers are open, the gaseous products from the fire pass through the central part of the device direct to the chimney. When the lowermost one is opened and the upper closed, the hot gases pass in the direction shown by the arrows, through slots formed in the innermost shell previously mentioned, and then through the interstices between the material placed in the annular space between the two shells. This material, by retarding the velocity with which the gases pass toward the chimney, thereby renders the same less sensitive to the action of external winds, currents, etc., than is found to be the case where they are conducted directly to their outlet, the draft being of course rendered much more steady and uniform. The coal or other hard lump material through which the gases pass of course absorbs heat therefrom, and this heat being radiated from the apparatus utilizes to a proportionate degree heat that would otherwise be lost. For further information parties may address S. H. Twitchell, 27 Bedford Avenue, Williamsburg, N. Y., whose advertisement appears in another column.

Fig. 1

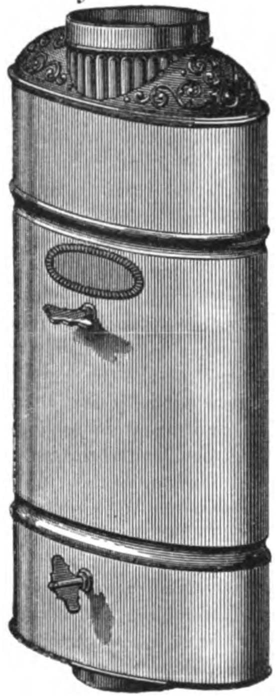
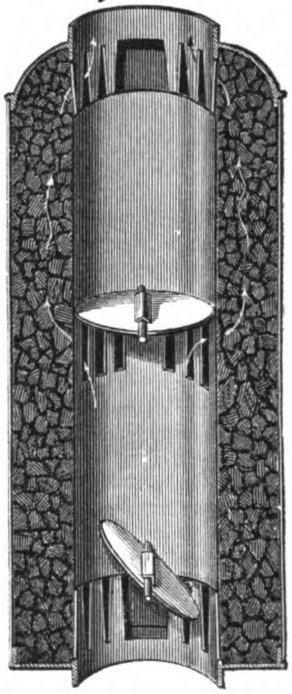


Fig. 2



ELECTRICAL FUSES.

ROBERT SABINE, C.E.

THERE are two descriptions of electrical fuses in general use for firing mines, torpedoes, etc. First, those in which heating power necessary to fire a charge is produced by the passage of an electric current through a fine wire, usually of platinum; and secondly, fuses in which the heating power is produced by the passage of electricity through a chemical mixture rendered conducting by the admixture with it of a salt of copper. Fig. 1 represents a form of fuse of the first description. It consists of two gutta-percha-covered copper wires of about No. 16 B.W.G. twisted together; two of the ends side by side are stripped of their gutta-percha for a short distance, and a fine platinum wire is soldered between them. These ends, with the platinum wire attached, are then enclosed in a short piece of gutta-percha tubing, one end of which is melted on to the gutta-percha covering of the copper wires, the other end being closed, when the fuse is charged, with a gutta-percha plug, so that the whole forms a water-tight receptacle. This receptacle is filled with fine-grain gunpowder, which becomes ignited when a current sufficiently strong to heat the thin platinum wire red-hot is sent through the conducting wires. It is better that the platinum wire itself should be coated with fulminate of mercury previous to the gunpowder being introduced, as it is found that this substance not only makes the fuse more certain in firing, but also has the peculiar effect of making the explosion of the charge of gunpowder or gun-cotton into which it is inserted much more powerful in character than when the fine-grain gunpowder alone is in contact with the platinum wire.

FIG. 1

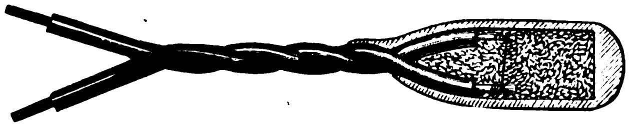
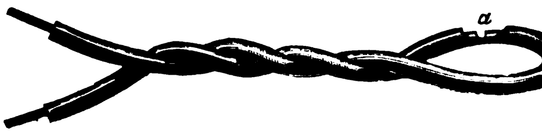


Fig. 2 is one description of fuse of the second type: it is known as Statham's fuse. It owes its property to the fact that, when a copper wire has been covered with vulcanized india-rubber for some time, the surface of the rubber in contact with the wire becomes covered with a layer of sulphide of copper, which is a moderately good conductor of electricity. The way in which this property is taken advantage of is as follows:—A piece of vulcanized india-rubber-covered wire is twisted together so as to form a small loop at the bend (Fig. 2). A small piece of the india-rubber is removed so as to expose the copper wire, and the wire is interrupted, as shown at *a*. If a current of electricity of sufficient intensity is caused to circulate through the wire, it will at the break pass through the sulphide of copper adhering to the rubber, and the resistance which it has to overcome in doing so causes the sulphide to ignite, so that, if the fuse had been introduced into a charge of gun-cotton, it would have caused its explosion. In this form of fuse it is desirable to fill the small cavity left by the removal of the rubber with the fulminate of mercury, for the reason before mentioned.

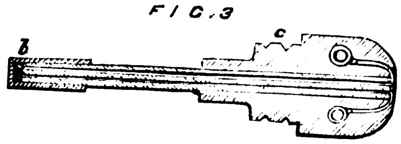
FIG. 2



In Abel's fuse, which is on the same principle as that of Statham, the priming material is a composition of subphosphide of copper, subsulphide of copper, and chlorate of potash, mixed very intimately in the proportions of ten parts of the first, forty-five of the second, and fifteen of the third. This materia is extremely sensitive in its action.

Fig. 3 is a representation of one of Abel's fuses. It consists of a boxwood head containing three perforations, one passing downwards through the centre, and two others which are parallel to each other on each side of the central one and at right angles to it. Through the center hole two wires, insulated side by side, are passed, a sufficient length being allowed to project through the top of the fuse-head, so that the gutta-percha can be stripped off for about one and a half inches. These bare ends of the wires are then pressed into slight grooves cut in the fuse-head, and the extremity of each is passed into one of the horizontal perforations, and there fixed by introducing a tightly fitting piece of copper tube, so that the wire is firmly jammed between the surface of the copper tube and the wood. Into these tubes the ends of the conducting wires are passed and fixed by forcing a short pin copper wire into the holes. The extremity of the double-covered wire, which projects a short distance from the bottom of the fuse-head, is cut to a clean sectional surface, care being taken that the extremities of the wires are not pressed into contact by the operation. Over the end of this double wire a little tinfoil cap is fitted, a small quantity of the priming composition, *b*, having been previously introduced. The cap is firmly pressed on, so that the composition is slightly compressed and kept in close contact with the ends of the wires. When the fuse is required for use, a paper case, filled with fine-grained gunpowder, is fitted tightly over the shoulder, *c*, and they are fixed with twine. The action of the fuse is the same as that of Statham; the electricity, in passing from one wire to the other through the composition, heats it, and causes its ignition, which in turn communicates itself to the gunpowder, and thence to the charge into which it is inserted.

FIG. 3



The advantages of the platinum wire fuses are: great facilities and safety in testing the condition of the electrical circuits; they can be stored for any length of time in any climate without deterioration; they can be improvised with great facility, the materials of which they are constructed being extremely simple; there is no necessity for a high degree of insulation in the electric cable, indeed a fuse of this description may be fired without difficulty with one or two feet of the conducting-wire stripped of its insulating covering. The great difficulty in the use of the platinum wire fuse is in the voltaic battery which must necessarily be employed with it. On behalf of the second kind of fuse—the tension-fuse, as it is called—its great advantage is that it can be fired by means of frictional electricity, or

by a magneto-induction apparatus, and by any form of voltaic battery. An ordinary medical megneto-shock machine, or a Pulvermacher chain-battery, readily fires an Abel fuse. High tension electricity, as produced from a magneto-induction or frictional machine, is inadmissible when it is necessary to use cables with two or more wires in each, or when two distinct cables run side by side for any considerable distance; as a current sent through one wire would, by induction, cause a current to circulate in the wire running parallel to it, and would cause the fuse in communication with it to fire also, although not intended to do so. Even when two cables running parallel to one another for half a mile are separated by a distance of twenty feet, a current passing through one will induce a current in the other sufficiently strong to fire a tension-fuse.—*Mechanic's Magazine.*

THE PRESERVATION OF TIMBER.*

BY RICHARD H. BUEL, C.E.

[Concluded from page 291.]

BETHEL'S process, patented in 1838, for the introduction of bituminous or creosotic liquors, such as oil of tar or pyrolignite of iron, into the pores of the wood, by exhaustion and pressure, has been very successful in a commercial point of view. It has been introduced into nearly all of the countries of Europe, and has received favorable reports from many government commissions. The preparation usually employed is the product obtained from the distillation of coal-tar, at a temperature of from 400° to 700° Fahr. It appears to act by coagulating the albumen of the wood, and by covering the fibrous mass to preserve it from contact with destroying agents. Creosoted sleepers have been employed on nearly all the railroads in England and Germany, and on many in France. Of course, as the creosote is more liable to change on exposure than the woody fiber, wood impregnated with this substance cannot be said to be imperishable, but instances are given in which railroad sleepers in Belgium have been used in exposed situations for more than twenty-five years. Prof. Rottier, of Germany, made some tests, a few years ago, to determine the preservative qualities of the different products of coal-tar. He found that the lighter oils, containing carbolic acid, aniline, and the naphthalized oils, afforded little protection to organic matter on exposure to the atmosphere, while the green fluorescent given off at from 527° to 608° Fahr. gave quite favorable results. The use of creosoted sleepers has been discontinued within the last few years on several of the railroads in England. It is stated that the sleepers are subjected to a smashing force, which is more destructive than the rot, so that prepared sleepers do not last much longer than those of the less expensive unseasoned material. The Midland R. R. Co. report that unprepared sleepers on their road last from fourteen to sixteen years, and that creosoted sleepers must be renewed at least every twenty years; so that as the unprepared sleeper costs 2*s*. 9*d*., and the price of creosoting is 1*s*., which, compounded for fourteen years, is 2*s*., it is cheaper to renew the unprepared sleepers as it becomes necessary. The fact of the matter probably is that the timber used is of such good quality that it does not pay to attempt to preserve it, since in our country sleepers are renewed on an average every seven years. This was stated to be the average duration of sleepers on the Belgian railways, and it was considered that a great saving was effected by introducing Bethel's process, the prepared timber lasting from twenty to twenty-five years. It should be remarked that there are some kinds of wood which, without any preparation, possess great durability. The heart-wood, containing less soluble matter than the alburnums, is not so liable to decay—trees of close texture, for the same reason, are more durable than others. The older trees are far more durable than those of younger growth, because the sap ceases its active circulation in the heart, and the pores of the wood are filled up with resinous matter, which, though less durable than cellulose, is not readily decomposed. We have examples of such trees in this country. The heart of what is known as "first-growth" timber, of pitch pine, cypress, and cedar, is very slow to decay. A patent was issued a few years since to T. W. Heinemann for a method of preserving timber by injecting resin into the pores, after first expelling the sap. It seems doubtful, however, whether by exhaustion and pressure the sap can be expelled, though there is no doubt that, if the inventor actually does accomplish this, his process is one of great value.

In all the methods yet mentioned for impregnating timber with preservative solutions, the expense of the process is greatly increased by the apparatus, time, and labor required. Dr. Boucherie's method, patented in 1839, accomplishes this result by simpler means, and possesses features of peculiar interest. His claim is not for the solution to be employed, but for the manner of introducing it into the wood. He describes his process as follows:—

"It occurred to me that the force which caused the circulation during the life of the tree might continue after it was felled, and I found that, if we cut a tree of great height, and immerse the foot of it within a certain time in a saline solution, whether weak or concentrated, a strong absorption is exercised by the tree upon the liquid, which thus penetrates the tissue, and soon reaches the highest point of the stem, if we are careful to furnish sufficient quantity of the liquid.

"Thus, in six days, in the month of September, a poplar tree, ninety feet in height and fifteen inches in diameter, the foot of which was immersed only eight inches into the pyrolignite of iron, at the temperature or 56° Fahr., absorbed the enormous quantity of three and a half cubic feet."

Dr. Boucherie ordinarily employed the impure pyrolignite of iron, because it is cheap, its acid is non-corrosive, it unites with all organic matters, forming insoluble compounds, and it contains a large amount of creosote.

Finding it inconvenient to maintain the tree in a vertical position during the process of impregnation, it was laid horizontally, and the operation was conducted as well as before. Dr. Boucherie also ascertained that a growing tree would absorb the preparation in all the sap-vessels that were opened for its admittance, and he impregnated growing trees in the following manner:—A three-quarter inch hole was bored in the tree, near the ground, and, by means of a small saw, a cut was made perpendicular to the trunk, leaving only enough uncut to keep the tree from falling. All the open parts were then closed with a tarred cloth, except a hole for the admission of a pipe from the tank which contained the preparation.

It was found that autumn was the best time for the impregnation of the timber, whether growing or felled, and that, if a tree was cut down, it must be treated within ten days. Most of the branches could be removed without affecting the result, but it was necessary to retain the terminal foliage.

A simple mode of impregnating wood cut in winter, and short pieces cut at any season, was discovered by Dr. Boucherie. This was done by fixing the log in a vertical position, and applying a waterproof bag containing the mixture to the top. The sap was thus forced out, and its place occupied by the solution. The same method could be applied, using water in the bag at the top, to merely wash out the soluble matters, without introducing any preserving mixture.

It was found that the hardness of wood was greatly increased by impregnation with the pyrolignite of iron, and the next point to which Dr. Boucherie turned his attention was the means of preserving the flexibility and elasticity of the material. Generally speaking, these qualities of wood depend upon the amount of moisture it contains, and it has been observed that, in the more advanced stages of the process of air-seasoning, the liability to crack is greatly increased. This suggested the introduction of a deliquescent salt, after expelling the albuminous matter of the sap, and a cheap material was found in the mother-waters of salt marshes, which contain deliquescent chlorides. This experiment proved very successful. Some pyrolignite of iron was also added to protect the woody fiber from the action of any albumen that might remain in the sap-vessels. This treatment rendered the wood much less inflammable, as shown by experiment.

In 1850, the French Government appointed a Commission of Engineers to report on the merits of Dr. Boucherie's invention, and another in 1852. Their investigations and experiments confirmed all that was claimed by the inventor, and he received from the French Government the rare distinction of the large gold medal of honor.

In 1846, eighty thousand prepared sleepers were laid down on the Northern Railway of France, and were examined from year to year. In 1855 some of them were taken up to be shown in the Exposition, and were found to be unaltered. The inventor, after being honored by the Government, as stated above, gave his discovery to the world, and the process has been largely used on the railways in France, and to some extent in England. Its great merit is, of course, its cheapness; and it was stated in the report of the French engineers that the cost of preparing railway sleepers was less than three cents per cubic foot.

Besides the rot, timber in certain situations is exposed to the attacks of insects—to the white ant in tropical countries, and the *teredo navalis* and the *limnoria terebrans* in water. Mr. R. Stevenson made some experiments at Bell Rock, in England, commencing in 1814, and extending over a period of thirteen years, in regard to the ravages of the *limnoria terebrans*. This insect excavates a cylindrical hole in the wood for its dwelling, and propagates very rapidly, so that in a few years the timber is rendered useless. Mr. Stevenson experimented with a great variety of woods, both unprepared and kyanized, and it was found that the kyanizing process afforded but little protection, the compound probably washing out. Green-heart, from Demerara and Brazil, beef-wood, an Australian tree, and bullet-tree, from the West Indies, were not attacked by the *limnoria* in thirteen years, while all the other varieties of wood became worm-eaten in periods ranging from eight months to four years. Creosoted timber was not tried in these experiments, but it is now employed for harbor works in England, and seems generally

* Paper read before the New York Society of Practical Engineering. April 18, 1872.

to repel the *teredo navalis* and the *limnoria terebrans*, though some few instances have been given in which creosoted piles have become worm-eaten. More experiments on the subject seem desirable.

The white ant of tropical countries enters the wood and lives in and on it, so that in a few years the whole interior is reduced to powder. Unprepared railway sleepers in India have to be renewed every five years, and the creosoted timber does not last much longer. Green-heart is not attacked by the white ant, and there are some aromatic trees which are exempt—but they are generally too expensive for sleepers—so that railway companies in India are giving up wood altogether in the construction of their roads. It is supposed by some that wood from which the sap has been expelled will afford no nourishment to insects, and this seems plausible when we observe that those woods which have the closest texture, or contain but little sap, are least subject to attack. The aromatic woods, also, are free from the ravages of the insect, so that the problem of preserving the timber from destruction in this way would not seem to be an impossible one. The whole subject is deserving of a thorough investigation.

I have thus given brief descriptions of the principal methods that have been proposed for rendering timber more durable. They have found their principal application in railway structures and harbor works, and have been but sparingly employed in ship-building and general construction. For ships, most of the methods proposed have many objections—salt, lime, and the metallic salts causing dampness and corroding the iron-work, while the odor of creosote will probably prevent its extensive use for this purpose. The principal reliance in preparing ship-timber, where wooden vessels are still constructed, is upon air or water seasonings, and by careful use of these means the durability of the wood may be considerably increased. The importance of using every endeavor to render our wooden structures more permanent does not seem to excite the attention it deserves. Our timbered lands are as yet so extensive that it is hard to induce people to prepare for a famine. It is astonishing, when we consider the great influence the disappearance of our forests has upon the country, that scarcely an attempt is made to remedy the evil. The public is, unfortunately, little wiser for the experiments of railroad companies, some of which adopt and continue the use of preservative methods, while others abandon them after a short trial. A subject so important as this might well receive attention from the General Government. In Europe, the rapid disappearance of the timbered lands induced careful investigations and experiments. More than forty years ago, the rapid decrease of the live-oak timber in the United States called into existence laws for its protection. It will be scarcely wise to wait until the near approach of a timber famine to provide remedies which become more difficult and expensive the longer they are delayed. The Commissioner of Agriculture presents these considerations so forcibly that an extract from his remarks may form a fitting conclusion to this paper:

"There are few subjects so connected with the wants of society, the general health of the people, the salubrity of our climate, the production of our soil, and the increase of our national wealth, as our forests, and yet no interest has received so little attention at the hands of the people, and enjoyed so little of fostering protection from the Government."

American Oysters.

THE trade in oysters in the United States affords employment during all the year, in the taking of seedlings, transplanting, growing, catching, shipping, and wholesale and retail departments, to more than 300,000 men, women, and children.

The centres of the trade are New York, Baltimore, Norfolk, and Fair Haven. Baltimore is the chief of the kegging and canning depots; but there are also vast quantities opened, kegged, and canned at Fair Haven, Conn., and other favored localities. We have, says the New York *Times*, well authenticated figures from Baltimore showing that in that city alone more than 5,000 men, women, and children are regularly engaged in opening oysters; and in opening, packing, and the shipping trade generally, more than 15,000 are employed. This is much the largest gathering of "oyster people" anywhere known in the packing and shipping departments; for, while there are a very much larger number engaged in supplying, opening, and serving New York, they are mainly engaged in the retail trade, a vast number of whom simply open and prepare them for use in the thousands of saloons in which oysters are a prominent feature on the bill of fare.

The oyster statistics of Baltimore show that there are thirty extensive packing-houses there, in which 4,500 men and women are engaged in opening oysters for the kegs and cans. An estimate of the average during four years shows that 6,945,000 bushels were disposed of yearly in the shell, wholly in addition to the enormous quantities kegged and canned. Of these an average of 4,880,000 bushels were brought from the Maryland shores, and 2,065,000 from those of Virginia.

Of the above quantity, an average of 1,050,000 bushels came to New York; 400,000 bushels went to Philadelphia; 350,000 to Boston; and 700,000 to Fair Haven, Conn. The same reliable authority declares that to dredge and prepare this vast quantity for shipment employed 1,000 vessels, averaging fifty tuns burden, and also 1,500 canoes. Added to these statistics we have, though not recently, given statistics of the average annual trade of Chesapeake Bay, which place the money value of the business at $20,000,000 per year. This estimate was made before the commencement of the war, and since its close the declaration is that the trade soon recovered former dimensions, and has since been increasing yearly.

The New Jersey shore trade employs about 600 vessels yearly, with the requisite number of men and boys, and the packing business alone of Fair Haven has a capital of $1,000,000. It employs 1,500 persons, and the yearly average of kegs and cans packed is 1,000,000 kegs and 500,000 cans. During past years an average of twenty-six vessels have been engaged in c rrying oysters from the Maryland and Virginia shores to plant at Fair Haven, and these, when opened, average a measurement equal to 2,640,000 quarts. Besides these there are numerous other sea-boards of the country at which, in the aggregate, very large quantities of oysters are taken, from which the adjacent inland populations are served.

Cocoa-nut Oil.

RESIDENTS of temperate zones have no realization of the immense importance of the cocoa-nut in countries where the tree abounds. It yields a delicious food, a nutritious drink, a rich oil, and fibers which are manufactured into thread, twine, ropes, and all kinds of strong useful cordage.

Boiling the pulp breaks open the cells. As the oil is liberated, it rises to be skimmed off. A few years ago the Dutch government ordered a census of the cocoa-nut trees in Java and Madeira, which footed up twenty millions, being an average of three to every native inhabitant.

Vast quantities of the oil are burned in lamps throughout the whole Indian Archipelago. A tumbler half filled with water has oil poured into the brim. Two lighted sticks are the wicks, which burn brilliantly. Every native glories in a display of lamps in the house and about the grounds at the approach of night.

When first taken out of the boiling pot, the oil has a rich flavor, but soon becomes rancid. So copious is the supply, however, it can always be had fresh and sweet for the table. Like olive oil in Syria, it is butter, lard, or oil, according to circumstances, in cookery. Soap is made with it, lamps supplied, leather dressed, and cosmetics are fabricated for beautifying the homely faces of women.

Best Timber for Cars.

SAYS a correspondent of the *Car Builder*:—"My impression is that for car-building oak should be discarded altogether, and pine substituted in its stead. This impression is based upon the fact that, in my own experience, I have always found that pine lasts longer than oak, and is generally more reliable in every way. Oak of the very best quality invariably gets short in the grain after being cut, even when kept close and dry, and is therefore very liable to break. Ordinary fresh pine, dry and free from snap-wood, has been uncovered after the lapse of centuries, and found to be as good as when it was first cut, if not, in many instances, stronger and better. Our oak and pine of native American growth, when placed together for comparison as to durability, show the following results, namely: that the oak does not rot, but gets weak and brittle, while the pine gets tougher and stronger the longer it stands, and from its lightness and great capacity of tension would seem to be the most suitable of all timbers for the purpose of car construction. In view of the rapid extension of our railways, and the corresponding increase of rolling stock required for their equipment, this is a subject deserving of more attention than it has received.

Practice Makes Perfect.

MR. BESSEMER, giving evidence before a committee of the Society of Arts, the other day, said:—"I have observed the sleight-of-hand that men acquire in various mechanical arts where they have a certain thing to do and that only: and it is really marvelous how, in three or four weeks, a man will do with ease what would have been pronounced an utter impossibility. Take, for example, the forging of steel. A man will take a bar of steel, which has to be forged into an octagon shape, and he will pass it under a heavy hammer, striking about 300 blows a minute, and will turn it exactly one-eighth of a revolution at each stroke, and the whole of the bar is forged with the greatest exactitude, though he has to alter the angle every 300th part of a minute."

A COMPANY has been formed in New York City to proceed to the diamond fields of South Africa. They have purchased a fine clipper bark, and calculate to provision her for six months. The shares are limited to one hundred, at $300 each. Most of the shares have been taken, and the company will be off at an early day. The agents of the company are Elisha Crowell & Co., No. 8 Coenties Slip, an old-established house, which is a guarantee that the enterprise will be carried out successfully.

Illumination in Warfare.

AMONG the various devices employed in war is that of casting a strong light on an enemy's position at night, so as to enable a fire to be directed on to it. When it is remembered that not only may night attacks and surprises be attempted, but that in the ordinary course of things trenches are dug, saps pushed forward, and batteries armed at night, it will be seen how valuable would be a really effectual method of illuminating a distant point. Various means have been attempted to carry out this object. The first idea was to project a mass of brightly burning composition among the enemy in the form of what is termed a ground light ball; then came the conception of a light floating overhead and casting its bright beams downwards; and finally, that of a fixed light burning steadily, whose rays could be reflected by means of a parabolic mirror on to the desired spot.

Ground light balls seem to have been employed in war for centuries; it is difficult to trace their origin, from the circumstance that, light and heat being generally strongly evolved by the same compositions, illuminating and incendiary projectiles were hardly distinguished apart. In fact, the very name of "carcass," now given to the latter class, appears to have been originally the designation of the former. The present service ground light ball consists of a mass of inflammable composition made up in the form of a short cylinder with hemispherical ends within a frame of hoop iron; the composition, which consists of a mixture of sulphur, saltpeter, resin, and linseed oil, is covered with canvas, and woolded round the cylindrical part with cord; the base end in all cases (and in large calibers the front end also) is protected by an iron cup, the larger ones having also lugs in front for lifting the projectile. We have noticed that the light ball we have just described was formerly termed a carcass; to most of us the name is unmeaning enough, but it has been suggested that the oldest inhabitant may remember bodies hung in chains from the gibbets that still linger on some of our hill-sides, that bore no slight resemblance to actual carcasses, reduced by the attacks of ravens and the work of time to mere black trunks, smeared with tar and bound in iron bands, so that they swung in the breeze long enough to connect their name with an appearance very similar to that of the light ball.

Far from there being anything remarkably good about the present pattern of ground light ball, it is so faulty that the fact that it has not been improved on must be attributed to a conviction in the minds of the authorities that the day for such projectiles has gone by. Its elongated form is quite unsuited to smooth-bored ordnance, for, having no rotation to steady it, it turns over and over in flight and carries very inaccurately; it is fragile, and can only bear a small firing charge. The composition is by no means the one that gives the most brilliant light, and it possesses, in common with other ground light balls, the disadvantage of being liable to be smothered down, while at best it can but light a very limited area of ground. When we enumerate the liability to be tampered with among the faults of the service ground light ball, we would notice that it is without any means of self-protection whatever; so that in Woolwich marshes the men under instruction carry burning light balls on spades, put them in buckets of water and the like, and, in fact, treat them as incapable of causing serious injury to any one. This is not the case with all ground light balls. At Malta, not many years since, some old light balls of unknown pattern were ordered to be burnt to add to the effect of a display of fireworks and lights, when it was found, on the ball first lit coming near the end of its time of burning, that it possessed a source of interest quite unlooked for, in the shape of a small shell, which concluded the performance by bursting, being no doubt designed to prevent interference on the part of the enemy, but hardly calculated to encourage the general public. Happily, the sea being at hand, no other light ball was allowed to burn many seconds longer on dry land.

To remedy the faults in the ground light ball, General Boxer proposed to fire a light carrying a parachute, formed to open out and suspend it in the air for a time, so as to illuminate a large extent of ground. Sir William Congreve had proposed a light similarly suspended from a parachute, which he fired into the air by means of a rocket, but which appears never to have been adopted. The Boxer parachute light was approved for the service in 1850, but it does not appear to have been actually used in war either in the Crimea or elsewhere. It may be described as follows:—A hemispherical mass of light composition consisting of saltpeter, sulphur, and red orpiment, is incased in tinned iron, and attached by means of three stout chains and six cords to the seams of a large calico parachute, which is itself folded and forced by hydraulic pressure into a tinned iron case approaching the form of a hemisphere, fitting on to that containing the light, so as to form a complete sphere, except that what we may term the upper pole has a depression on it, and a groove runs in the direction of a meridian connecting the poles. A second tinned iron case fits over that above mentioned, bushed so as to take a fuse opposite the depression in the parachute hemisphere; here is also inserted a little quick-match in a shallow bag, forming a bursting charge, from which a quick-match leader runs round the meridian groove, communicating with priming and a fuse in the lower pole of the light hemisphere. This projectile is fired from a mortar.

WATER VELOCIPEDE.—A Minnesota genius has invented and applied for a patent on a water velocipede. It is composed of two air-chambers, cylindrical in form, eight feet in length, and about a foot in diameter, placed in a parallel position, forming the boat proper, or so much of it as rests upon the water. Serpentine flanges or screws extend the full length of each cylinder, and are the propellers. On the platform above a one-wheeled velocipede is placed, from which, by a system of endless chains and mitred gearing, motion is given to the cylinders. It is claimed that with one man the boat will draw two inches of water, and that it can be propelled at the rate of a mile in four minutes.

GREAT BRITISH GUNS.—The thirteen new English guns of 35 tuns, now completed, are the most powerful pieces of ordnance in existence in this or any other country. These guns are specially intended for the navy, and are to be first used in the three large iron-clads now in course of completion. Two of these ships, the *Thunderer* and the *Devastation*, are of 4,400 tuns burthen, and the other, the *Fury*, is of 5,000 tuns. Each of these vessels will be provided with four of the 35-tun guns, which they will carry in two turrets, two guns being placed in each turret side by side.

THE hair on a camel weighs about ten pounds and sells for more than $100.

A WHITE cedar log, in a perfect state of preservation, was found at a depth of thirty-six feet by a well digger at Delavan, Ill., a few days since.

LEAVENWORTH, Kansas, celebrated the completion of its new bridge over the Missouri with great enthusiasm on the 18th of April, there being speeches, music, processions, and a crowd in attendance estimated at 20,000 persons.

COAL-OIL *vs.* SHAD.—Since the introduction of coal-oil refineries along the Schuylkill and Delaware, the original fine flavor of the shad caught in these rivers has been materially injured, partaking of the rather unpalatable taste of kerosene.

A MISCHIEVOUS muskrat bored a hole through the dam at the trout-pond of Messrs. Jewett & Co., in Fitchburg, Mass., a few days since, and let some eight hundred pounds of fine trout into the brook below. For several days there was good fishing between the pond and the Nashua River, a distance of about half a mile.

METAL MARKET.

[*Corrected weekly for the "American Artisan."*]

NEW YORK CITY, Saturday, May 11, 1872.

COPPER.

Duty: Pig and Bar 5c. and Sheathing 4c. per lb.

American Ingot	$— 40	@	— —
Sheathing, new (suits), per lb	— —	@	— 46
Sheathing, old	— —	@	— 36
Sheathing, yellow	— —	@	— 30
Pig, Chile	— —	@	— —
Bolts	— 32	@	— 48

IRON.

Duty: Bars 1 @ 1½c. per lb.; R. R. 70c. per 100; Boiler and plate, 1½c. per lb.; Band, Hoop, and Scroll, 1¼ @ 1⅜c. per lb.; Pig, $7 per tun; Sheet, 3c. per lb.

Pig, English and Scotch, per tun	$49 00	@	55 00
Pig, American	48 00	@	57 00
Bar, English and American	— —	@	105 00
Bar, Swedish, assorted grades	85 00	@	100 00
Sheet, Russia, per lb	— —	@	— 18½
Sheet, Single, D. and T. Common	— 6½	@	— 7½

LEAD.

Duty: Pig, $2 per 100 lbs.; Pipe and Sheet, 2½c. per lb.

German, gold	$5 90	@	6 00
Spanish gold	5 90	@	6 00
Bar, net	9 25	@	— —
Sheet and Pine, net	10 00	@	— —

NAILS.

Duty: Cut, 1½; Wrought, 2½; Horseshoe, 5 cents per lb.

Cut, per 100 lbs	$5 75	@	8 00
Clinch	7 25	@	7 75

SHOT.

Duty: 2½c. per lb.

Drop and Pk. (cash) per lb	— —	@	— 10½
Buck, comp. (cash) per lb	— —	@	— 11½

SPELTER (ZINN).

Duty: In Pigs, Bars, and Plates, $1 50 per 100 lbs.

Plates, gold	$7 12½	@	7 37½
" dom	— 7	@	— 11

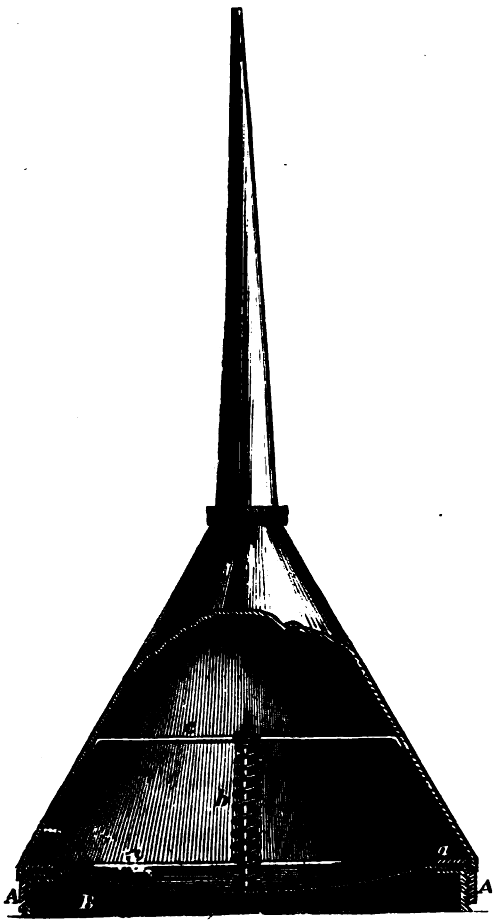
TIN (ZINN).

Duty: Pig, Bars, and Block, 15 per cent. ad val.; Plates and Sheets, 25 per cent. ad val.

Banca, cash, per lb., gold	$— 50	@	— —
Straits, gold	— 40	@	— 41
English, gold	— 40	@	— 41
Plates, i. C., cash	15 00	@	16 00
Plates, i. C	15 50	@	16 00

DWYER'S PATENT OIL-CAN.

THE improvement herewith illustrated relates to that class of oil-cans in which the oil is ejected by pressure of the thumb upon the bottom, made elastic for the purpose. As hitherto constructed, such cans have possessed but limited durability, inasmuch as the bottom of the device commonly became worn or burst long before the body; and inasmuch as the bottom, being soldered fast, formed an integral part of the latter, the destruction of the bottom caused the loss of the whole; the necessary repair in such case not warranting the expense. This is obviated in the improved can by making the bottom readily detachable, whereby when necessary or desirable it can be replaced by another, and as several bottoms can



be sold with the can the cost of repair is rendered extremely slight. The can is of the usual form, but provided at its base with an annular base-piece, A, of brass or other metal securely soldered in place. Formed at the upper edge of this fixed ring or base-piece, A, is an internal flange, *a*, below which, on its inner surface, the base-piece is screw-threaded for the reception of an annular nut, B. A washer of leather or like material is laid in contact with the outer surface of the flange, *a*, the elastic bottom, C, is then placed with its edge upon the washer just mentioned, and a second washer is laid upon the edge of the opposite side of the bottom. This done, the nut, B, is screwed home, and firmly clamping the edge portions of the bottom, together with the washers, tightly fixes the bottom in position. The nut, B, is, in practice, fitted with internal projections whereby it may be easily turned. The bottom has the usual swelled or bulging contour, and may be fitted with the spring, *b*, arranged between it and the fixed transverse bar, *c*, but this may be dispensed with when desired without detriment to the essential feature of the invention.

This improved oil-can was patented through the "American Artisan Patent Agency," April 12, 1870, by Mr. P. T. Dwyer, of Elizabethport, N. J., who desires to dispose of the entire right to the invention.

New Modes of Prospecting Mines.

THE Virginia *Enterprise* mentions a new mode of prospecting, recently adopted in the lower level of some of the principal mines on the Comstock lode, in which it is desired to keep the condition of the ledge from the knowledge of the workmen. Heretofore it has been customary to run a drift along the vein, and cross-out at intervals for the purpose of examination. Of course, with this plan, every one gaining admission to the cross-cuts could tell exactly how the vein looked, which did not suit the managers, who desire to have earlier information than the rest of mankind. So they have adopted the device of running a drift in the country rock, parallel to the vein, and boring from thence into the ledge at intervals to determine its character and value.

By the boring-in plan the miners see nothing but the borings that come out, and cannot tell whether they are in paying or barren rock; but by frequent assays, the superintendents know exactly what they are about. It has leaked out that one or two leading mines in Gold Hill and the same number at Virginia City have thus been pretty effectually gauged for long distances on from one to three levels. While outsiders have been wondering at the great amount of time consumed in running long drifts parallel to the lead in the mines of several companies, and while they have been asking themselves why no cross cuts were made, the superintendents have been quietly boring into and feeling their way along the vein.

Steel-headed Rails.

THE steel-headed rails have been found, on trial by the engineer of the Reading Railway, to separate at the welds to an extent of 25 per cent. of the rails laid down. It may be predicted that the use of the compound article is likely to be discontinued, especially as the price of steel has been brought so near to that of iron.—*Am. Railway Times.*

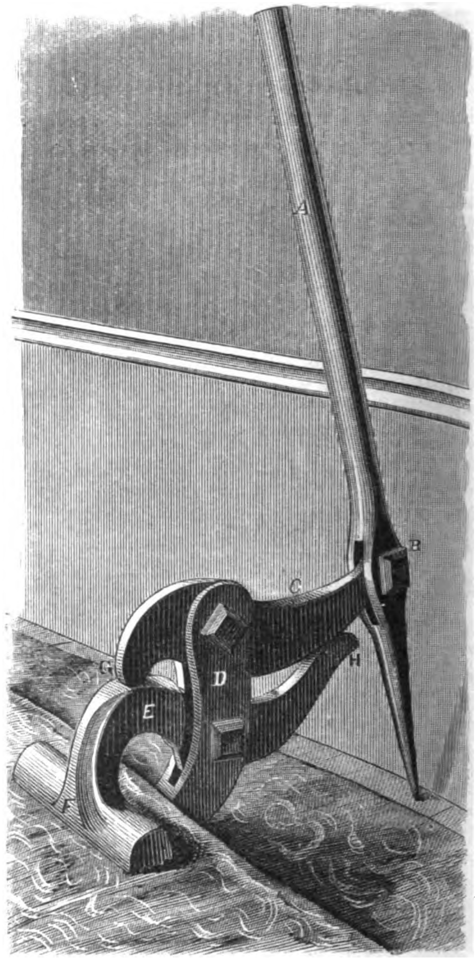
LINDSAY'S CARPET STRETCHER.

THE severe labor attending the stretching of carpets by the hands, unassisted by any artificial appliance, is a matter of common experience. Most of the implements intended to relieve this labor are awkward to manipulate, injurious to the texture of the carpets, and so defective in other respects as to render such a compact, efficient instrument as we herewith illustrate a very desirable improvement.

This instrument is exceedingly strong, being made wholly of iron, and so powerful that the thickest and most unyielding carpet can by its use be stretched with ease. While holding a carpet with great tenacity, it will not injure the texture in the least. It adds to these merits cheapness and durability.

In the engraving, A represents a strong lever, pointed at the bottom to engage the floor of an apartment close to the washboard. To this lever is pivoted, at B, the lever, C, the fulcrum of the latter being the pivot, B. This pivot joins the lever, C, to the lever, D. To the lever, D, is pivoted the lever E. The levers, D and E, have formed upon them serrated jaws, F, which engage the carpet at a proper distance from the edge.

The jaws being properly placed, and the point of the lever, A, being stuck into the floor near the washboard as above described, the upper end of the lever, A, is pressed in the direction it is desired to stretch the carpet. The lever, A, carries with it the upper end of the lever, D, which causes the lower jaw to advance toward the upper one, or, rather, this jaw rests upon the floor while the upper jaw, F, is forced down toward it by the pressure upon it of the end, G, of the lever, C, upon the top of the lever, E. The more the top of the lever, A, is pressed, the firmer will be the hold of the jaws upon the carpet.



On reversing the action of the lever, A, the lever, C, presses upon the lever, E, at H, and this, together with the reversed action of the lever, D, separates the jaws, so that the instrument can be placed in position to take a new hold. It will be seen that only a single motion is required to cause the tool to engage the carpet, and only one to release it from this engagement, and also that the lever, C, partakes of the nature of a link.

This invention was patented through "The American Artisan Patent Agency," May 14, 1872, by James Lindsay, 210 Centre Street, New York, who may be addressed for further information.

WOODEN NAILS.—A writer in the *Hub* thinks that wooden nails will yet come into quite extensive use, because wood may become so valuable that it will not pay to use the material of old packing-boxes for fuel as is now done, and then the objection to the use of iron nails will be seen in a practical light. If boxes were put together with nails of wood, the injury to tools in making them serve for other purposes will be materially lessened, and a great saving of valuable lumber be made.

AMERICAN ARTISAN

BROWN & ALLEN, Publishers,

ISSUED WEEKLY AT

No. 189 Broadway, New York.

H. T. BROWN. L. ALLEN.

AGENTS.

AMERICAN NEWS COMPANY, New York City; NEW YORK NEWS COMPANY, New York City; NEW ENGLAND NEWS COMPANY, Boston; A. WINCH & Co., Philadelphia; H. TAYLOR & Co., Baltimore.

WEDNESDAY, MAY 15, 1872.

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[Illustrations are indicated by an asterisk.]

IMPORTANT TO INVENTORS.

INVENTORS who contemplate securing letters-patents for their inventions will consult their interests by intrusting their applications to the "American Artisan Patent Agency."

Brown & Allen have had upwards of twenty-seven years' experience in the patent business, and are prepared at all times to render their professional services in the examination of inventions, preparing specifications, drawings, caveats, re-issues, trade-marks, prosecuting rejected applications, interferences, and extensions, and to practice as experts in litigated cases.

Inventors and all others interested in patents are invited to consult with us at our office or by letter.

CANADIAN PATENT LAW AMENDMENT.

A BILL has been introduced into the Canadian Parliament for the amendment of the patent law of the Dominion, to enable Americans to obtain patents in Canada upon the same terms as Canadians. We are informed, on the best authority that there is no doubt as to the passage of the bill, and that it will probably become law on or about the first of July next. We shall endeavor through the columns of the AMERICAN ARTISAN to keep such of our readers as are interested fully posted on the subject.

CONCERNING FIRES—FIRE-ESCAPES FOR MANUFACTORIES.

ON Monday, May 6, the workmen in Niblo's Garden, New York City, while busy in putting up "the gorgeous scenery of Lalla Rookh," saw a flame break out high up in the dome, over the parquette, and rushed to two force-pumps, one situated on the stage, and one in another part of the building. These, however, simply threw streams that, after rising forty or fifty feet, fell back in a useless shower, the fire not being reached at all. By the time the engines of the city were on hand the falling sparks had ignited the stage and its immediate surroundings, and the conflagration was under too much headway to be stopped, short of the destruction of the theater. Of course neighboring establishments were also injured, the entire loss, estimated, footing up about one hundred and twenty thousand dollars. And all this for want of a steam-pump and hose, which in a structure so peculiarly liable to fire as a theater should certainly constitute one of its adjuncts, and which should be so arranged that at a moment's warning a jet could be thrown to the top of the dome or the farthest corner of the wings.

But there is something more to be considered in this connection than the mere loss of property. Had the fire broken out when the auditorium, instead of being empty, was filled with people, the loss of life would probably have been immense. Nothing can provide against the helpless but death-dealing terror of a crowded audience, in case of sudden danger, but the most facile means of exit. And this, with possibly two or three exceptions, is not possessed by any large place of amusement in New York City.

While on this topic, we may as well refer to a class of buildings in which the liability to conflagration, and the loss of life resulting therefrom, are fully as great as in theaters and the like. We speak of manufacturing establishments, often located in buildings several stories high, and furnished only with narrow stairways and no adequate means whatever for quick escape. In a factory in Wooster Street, in this city, not long since, two men were burned to death in full sight of the crowd below, because the stairs were burned away and no fire-escape had been applied to the building. We are perfectly aware that objections exist to nearly all apparatus of this kind, but these are not so insuperable as to justify the neglect of such devices, and their improvement would quickly follow any disposition on the part of builders or owners to extensively adopt them. But such disposition is not likely to come in any way other than as the result of stringent legislation, which cannot be brought about too soon or be too rigidly enforced. Until this is done, we may look for loss of lives as well as property by fire, for outbursts of popular indignation, whenever any flagrant carelessness is shown, and for a constantly recurring obliviousness on the part of the public, leaving operatives in the same danger as before.

CANOES AND CANOEING.

CANOEING promises to become a favorite pastime here, as for a few years since it has been abroad. A canoe club has been organized in New York, and the construction of these light craft will doubtless become an established branch of industry, as the production of boats for river racing and the like has already done.

The modern canoe is a quite different affair from those used by the Indians with whose vessels we ordinarily associate the name, but, in the one case as in the other, there must exist the essential requisites of lightness and strength combined. The Indians in the wooded portions of the country constructed their craft by making a light frame of cedar-wood and covering it with a huge sheet of bark from the white birch. The Western tribes, having no such material, substituted for it the hide of a buffalo, and with these unreliable things—for they collapse after a few hours' immersion, and require to be dried again before further use—some of the explorations of the great rivers of the West were carried on. But the white man, after trying tin, iron, and india-rubber, has arrived at the conclusion that cedar-wood next to paper is the best material for canoe construction. But the longest voyages have been made with wooden ones. Four or five years ago an English canoeist traversed the different regions of Europe to an aggregate of three thousand miles. A paper canoe for one man can be made in England for about seventy-five dollars gold, and weighs about sixty pounds.

In New York, the form and construction known as the nautilus is most approved, although of wood, the keel being oak and the hull of cedar. Abroad, there are several types, all more or less in favor. Assuming the traveler to weigh one hundred and sixty pounds, a nautilus should have a length of fourteen feet, and a beam of two feet four inches. It is lowest amidships, its depth there being twelve inches, rising to twenty at the stern and twenty-two at the bow. In each end is a water-tight compartment, and the whole is so contrived that in event of a capsize it will right itself as soon as relieved of its burden. It is fitted with a sprit-sail, seven feet from tip to boom, and is, indeed, calculated more for sailing than paddling, while the reverse is the case with most of the English canoes.

The last mentioned, known as Rob Roys, are divided into three classes, viz., a long narrow canoe for racing, and which is capable of great speed; a sailing craft, with a keel; and a traveling canoe, which, more than the others, comes up to the popular idea of a canoe properly so-called. This latter is thirteen feet long, twenty-six inches wide, twelve inches deep, and has a "comber" of two inches. The opening in the deck in which the voyager places himself is four feet long and one foot eight inches wide. A canoe for two persons, sitting face to face, should be about two-thirds larger.

Of course the canoeist bent on far travel and out-of-the way adventure must possess means of cooking, fishing, hunting, etc.; and in supplying these minor conveniences much ingenuity and adaptiveness has been displayed. An apparatus heated by a spirit-lamp serves for the preparation of food. Waterproof haversacks carry tea, coffee, sugar, rice, and other comestibles, as well as quinine to cure the ague, which much living upon rivers winding between malarious shores is apt to induce. As the practice of canoeing possesses a certain element of utility, especially in the exploration of unknown or little known regions penetrated by creeks and rivers, and, moreover, gives a sense of danger charming to many who are young and athletic, and with plenty of time upon their hands, we may expect a longer continuance of favor for it than is usual with many of the hobbies of the day.

THE RAMIE PLANT.

A NEWSPAPER published in Georgia states that the ramie plant on suitable soils grows with all the thrift of a weed and almost without cultivation. In one instance last season the stalks shot up to a height of six feet, were eaten to the ground by cattle in the autumn, and the following (last) spring grew again until now they are waist-high. This, if true of any considerable area of country, speaks well for the future of this plant, which has of late come to be considered more as a material in the hands of venders than as a promising subject for legitimate enterprise. The truth once established that the material can be obtained in large quantities, the difficulty of preparing the fiber for textile purposes will disappear. On the other hand, planters once convinced that a market can be had for the product, will give greater attention to its growth. Thus mechanicians and agriculturists are alike interested in watching and in promoting a thorough investigation and trial of the merits of the plant: we say of the plant and not of the fiber, for the value of this last seems to us to be already established. We have seen skeins of it that rivaled in fineness and luster the raw yield of cocoons, and which we were informed, on what we believe was good authority, was successfully applied, mixed with silk in large proportions, in the fabrication of silk hats.

The treatment of the stalks to separate the fibrous portions will probably combine both mechanical operations and chemical processes; the former of which we think will be comparatively simple. We have seen in San Francisco, where the matter has attracted much attention, a machine for the purpose in which a series of corrugated rollers crushed the stalks, and suitably arranged scraping blades and rollers expelled the useless pulp. Whether maceration and similar operations well known especially in extracting fiber from tropical leaves would not aid the operation is an open question. But reasoning by analogy this would produce good results, and, as the apparatus required would be comparatively inexpensive, the plan is well worthy of a trial by those taking an interest in a matter in which lies at least the possibility of a considerable and profitable industry.

MANUFACTURES IN THE SOUTH.

IT is stated that there is now a demand for one hundred locomotives on Southern railroads, and as the cost of these will aggregate one million of dollars, some of the Southern vehicles of public opinion are advocating the establishment of engine works in the South with this near prospect of work as the starting point. The Virginia Legislature has even gone so far as to require the Pennsylvania Railroad Company to have their locomotives running on roads in that State made in home establishments. Richmond appears at present to possess the greatest facilities for production in this department, having already a large freight-car manufactory, while the Tredegar works are prepared to enter, at an early day, upon the production of passenger cars.

But efforts to introduce and encourage manufacturing interests in the Southern States need not be confined to places as far north as Richmond, which has possessed a considerable share of Northern skilled labor. Neither need it be in any wise confined to the building of locomotives, cars, or other railway adjuncts. There are fuel, iron, and water-power enough in that region to constitute the basis of the most extensive and promising industries in the working up of the cotton and other products of the Southern soil. A more general diffusion in the Northern States of information concerning the undeveloped resources of the South, and a more thorough appreciation in the last-named section of the hard and practical methods pursued in all branches of enterprise by the energetic residents of the Middle, Northern, and Eastern States, is much more than half of all that is required to develop manufacturing interests in the Southern country to a point beyond the dreams of the most ardent of her people.

ASPHALT PAVEMENTS.

THE pavement question is of even greater importance in London than in New York, and it is not unlikely that American projectors may gain something from a close observance of the English methods. More particularly is this the case with reference to asphalt, than which no material has been more persistently misrepresented by the misnomer applied to plastic paving. Indeed, it is doubtful if any genuine asphalt has been used in New York, coal-tar being adopted as the basis of the so-called asphalt which, in one notorious instance at least, was laid down only to be taken up again. Far different is the street surface formed by the Val de Travers product so extensively employed in Paris, and of late adopted to some extent in London. The results of these recent English experiments are of interest as showing the utility of the substance as compared with wood and stone.

The asphalt deadens the sound of hoofs and wheels in a very great degree, but in this respect is not quite equal to wood, to which, however, it is superior in possessing no interstices, which obviously increase the draught of vehicles, and (from its imperviousness) insuring a much more rapid evaporation, so that the streets become dry much sooner after a shower. Add to this the ease with which it is kept clean, and the impervious obstruction presented by it to the upward passage of deleterious gases from the soil, and its merits, in some respects, will be seen to be undeniable. On the other hand, asphalt when it is wet is extremely slippery, and horses fall with far greater frequency and rise with greater difficulty than upon either wood or granite. To obviate, or at least to diminish, this drawback, it is proposed to sprinkle sand upon the pavement, but it is doubtful if this addition of a loose and powdery material will not provoke objections even greater than that which its use is designed to avoid. The admixture of some granular substance with the top portion of asphalt might perhaps be feasible, but the carrying into practice of such a plan would be subject to all the risks of a new and untried experiment. Whether the more obvious plan of intermingling the foreign matter throughout the entire mass would prove better is doubtful, as it would destroy the tenacity and adherence to which the layer of asphalt, as a whole, owes much of its utility. As compared with granite blocks, asphalt is found to be less suitable for rapid travel, and to provide for the facile stopping of vehicles the extensive adoption of brakes is recommended; this recommendation, however, being one to which our American cartmen would be likely to pay but little attention.

The laying of asphalt roadways depends much upon the weather, which must be dry. No difficulty on this score need be apprehended during our hot, dry summers, and the material that would harden enough for traffic under the blazing sun of July or August would be proof as wood to any average amount of travel. Public convenience, moreover, is less liable to be interfered with by the laying of this pavement than is the case with almost any other, inasmuch as it is ready for use as soon as finished, whereas over wood and stone is more or less of sand and gravel, sources of unmitigated and unmeasured dust. Several apparatus for applying the material, which must be used hot, have been devised, but the *Engineer* believes that "a good deal of improvement may be effected in this manner." In laying some of the streets in London, the asphalt is heated in boilers furnished with internal paddle-wheels, to continually stir the liquid mass and thereby insure its perfect homogeneity. Two of these boilers are simultaneously operated by a portable engine. In the English capital several asphalt companies have entered into competition with each other, and it is believed that this will eventually bring the price so low as to render its use for the purpose under consideration less costly than stone.

As is well known, the Seyssel or Val de Travers asphalt is a bituminous limestone quite different from the asphaltum or bitumen of California, Trinidad, etc., the latter containing no lime. Some time since we noticed, in a San Francisco paper, an item to the effect that an artificial combination of asphaltum and lime had been made which equaled in hardness and apparent durability the foreign substance. If this is correct, a new branch of industry may evidently be founded upon it. If the statement is not borne out by facts, it is still evident that an artificial compound possessing the composition and the properties of the true asphalt is quite within the possibilities of invention. And projectors will find in this a much more promising field for research and experiment than in any further tinkering with coal-tar.

CONVENTION OF THE CIVIL ENGINEERS.

THE American Society of Civil Engineers, which numbers upwards of two hundred leading representatives of the profession in this country, hold their annual Convention in Chicago on the 5th of June. A large attendance is expected, and many elaborate papers on different subjects are promised These gatherings conduce much to the usefulness of the profession, to the popular diffusion of technical information, and to that fellowship and good feeling which characterize the engineering profession.

USES OF RAW HIDE.

(Condensed from the *Shoe and Leather Journal*.)

IN England, the manufacture of hide rope is carried on to a large extent. It is used for hoisting purposes in warehouses, mines, etc., as also on shipboard for tiller and sky ropes. It is made from the hides of cows, buffaloes, etc., in this wise:—The hide being limed and freed from hair is placed upon a round table, when the workman, with a knife made for the purpose, rounds off the extreme portions, such as the shanks, cheeks, and the like, until the hide is rendered comparatively round; he then commences to cut a strip of the required width, which he continues in one length until the whole hide is cut up. A number of the strips thus made are taken and stranded or plaited togethe according to the thickness of the required rope. The rope, being thus far completed, is then submitted to the action of a solution composed of ingredients which have the effect of preserving the hide from decay, as also rendering it soft and

pliable. Sailors approve of it for tiller ropes in preference to a chain, because, as they aver, it does not make the rattling noise which is produced by the motion of a chain, and, furthermore, in cases of emergency, if it should happen to break, the rupture is not so sudden as that which characterizes the breaking of a chain, and therefore time is afforded to meet and provide, to a certain extent, for the threatened calamity, whilst it is not affected by humidity or extreme dryness, as is the case with Manila or hempen ropes, and, its tenacity being tenfold greater, it is less cumbersome, and consequently lighter. We have been surprised that it has not been employed in the manufacture of the rope employed upon railways for communicating between conductor and driver, because it could be made so much lighter, and, besides, would not be affected by the weather if prepared of the proper material and in the proper manner. The writer, who was the original inventor of the passenger signal in England, employed such a rope for the working of his semaphore bell and whistle signals.

Raw hide is used for the purpose of making belts, in some cases by cutting it into strips and sewing them together, although a firm in Leeds, Yorkshire, England, took out a patent for the purpose of making belts of a certain width *in one length*, without sewing or fastening, and this by means of cutting out the belt to the required width in one continuous piece, until the whole superfice of the hide was converted into one long strip or band. It was then fastened upon the periphery of a drum, the inner portion or cut being strained so as to correspond with the outer edge or cut; after remaining so strained until it was dry, it was then taken down and passed through a preparation for the purpose of curing it and rendering it soft and flexible. We do not know how it succeeded, but doubt not that any difficulties might have been overcome if met with a sufficient amount of ability and perseverance. In Wales, Ireland, Brittany, and Canada, raw hide is used for many purposes, such as chair bottoms, sieves, thongs, snow-shoes, etc., etc. In the Cape of Good Hope, and other parts of Africa, a sort of preserved hide has been, from time immemorial, used in the making of harness.

American Timber Interests.

"We are threatened with a want of sufficient quantity of timber to meet the actual necessities of life. Twenty million people are living in dwellings chiefly constructed of wood; their barns and out-buildings are of wood; the fencing of their farms, more expensive than their other improvements, is of wood; and all these are perishable with time. Moreover, our sixty thousand miles of railroad consume annually immense quantities of timber. Twenty-one thousand six hundred cords of wood are daily consumed in running railway trains three hundred and twenty thousand miles each twenty-four hours. Sixty thousand miles of road require twenty-five hundred ties to the mile and, as they must be replaced every five years, an annual consumption of thirty million ties is required. We will soon construct each year ten thousand miles of new road, requiring twenty-five million more ties, and, when we add to all these sources of forest destruction the wood required in the fencing of these railroads, the half million telegraph poles which each year will be required, and the vast amount of the destruction of forest by flood and fire, we must be absolutely startled with the conviction that whole provinces of woods which have required a hundred years to grow, are each year being swept away, while nothing is being done by either public authority or private zeal to supply the place of that which is destroyed, or protect in any measure that which exists."

These are "hard facts," and whether people mind them or not to-day, they will give them some thought hereafter. In France, the forests were cut down with the utmost recklessness, and for the last thirty years her fertile valleys have been swept by terrible floods, carrying away all kinds of property and covering the rich soil with gravel and sand. In Russia, the forests are beginning to disappear, and a law is now in force making it illegal to use anything but coal for fuel on the railroads. The timber lands of Germany are under the special protection of the government, while in Japan every one who cuts down a tree is compelled at once to plant another. The experience of these countries foreshadows that of our own. Thoughtless men and reckless corporations may go on stripping the land of its forests, but at last every one will be convinced of the necessity of a change.—*Exchange.*

Electric Gas Lighting.

In order to insure as far as possible the safety of the gunpowder works at the Royal Arsenal, Woolwich, England, the gas-lamps are in future to be lighted by means of electricity. This process has already been adopted at the cannon cartridge factories and several other workshops, where the quantity of explosive material is necessarily large, and it is understood to be intended to apply this system to all the buildings in the Royal Arsenal where work of a similar nature is carried on. The whole of the lamps by which these workshops are lighted are invariably fixed outside the windows, and open only on the outside of the building; but it has been thought that lighting them by the ordinary means is nevertheless attended with danger, and their ignition by wires in connection with a galvanic battery will be the means of insuring greater security against accidents.

Launch of a New American Steamship.

The large screw steamer *City of Havana*, which was launched on Thursday, May 9, from the yard of John Englis & Son, Green Point, L. I., is built for F. Alexander & Son, to run between this port, Havana, and Prospecto (Sisal), on the Mexican coast. She numbers seventy on the list of vessels turned out from the yard of the Messrs. Englis, at Green Point. She is a brig-rigged three-decker, with a capacity of about 2,300 tuns, carpenter's measurement. Her dimensions are as follows: Length between perpendiculars, on the water-line, 245 feet, and 270 feet on the main deck; beam, 37 feet 6 inches; depth, 26 feet 6 inches. She will have upper and lower cabins, with state-room accommodation for 125 first-class passengers.

Imitation Leather.—For producing imitation morocco or other leather, a foreign exchange recommends a composition consisting of one pound of glue to five liquid ounces of glycerine, boiled linseed oil being added for flexibility, or india-rubber for elasticity, together with coloring matter. The composition is spread while hot upon the fabric, and impressed with the design. The hardened impressed surface is treated with a solution of alum or chrome or other alum, or with a solution of sulphate of iron, copper, or zinc. The alum or sulphates may be mixed with the composition before it is spread. The surface is protected by varnish or waterproof composition, and ornamented by gold, bronze, or other coloring material.

COMMUNICATION.

Messrs. Editors:—I saw a call in the American Artisan for a machine for separating the light grain from the good.

If the following plan (which I saw tried over thirty years ago in the State of Michigan) will be of any use to your readers, they are welcome to it.

For wheat, take lye from wood-ashes, strong enough to bear up a potato. Pour the grain into the lye, skim off all that floats, pour off the lye. The grain can be rinsed if thought best, or it can be dried for sowing. It will not hurt the grain if it is not allowed to remain in the lye. The grain should be spread so that it would dry quick.

This method of treating grain not only removes light weight, but destroys insects or their eggs that may be in the grain.

For lighter grains make the lye less strong.

Yours, W. L.

Waterbury, April 29, 1872.

A new line of two American steamships has been established between New York and Hayti, which has been subsidized by the Haytien government, each in $12,000 gold per annum, to carry the mail. They sail hence on the 1st and 15th of every month; that on the 1st, the *Vicksburg*, going via Turk's Island and Cape Haytien to Port-au-Prince; that on the 15th, the *Equator*, going via Aux Cayes and Gonaives to Port-au Prince. They are each about 200 tuns burden.

Sardonic.—There is a cynical lady in Meriden, Conn., who amuses herself with the polite hypocrisy of society in a curious way. She has an orange plant in her parlor which bears neither bud nor blossom, but she has had two full-blown flowers and a half-opened bud of wax placed upon the barren stalk. Her callers all admire the sweet perfume of her lovely flowers, and the gentlemen have noticed that the bud has expanded considerably since they called before.

An interesting discovery has been made in a field near Apremont, in France. The mouth of a cave was found within 18 inches or 20 inches of the surface, and on exploring there was found a mass of enameled pottery, consisting of small figures, which are attributed to Bernard Palissy. The Comte de Grandpré, to whom the property belongs, intends to continue the research.

An explosion of fire-damp occurred at the Pillbrook shaft, near Scranton, Pa., on the 26th ult., resulting in the buring of five miners, who cannot possibly recover. There was another explosion in the Hampton Breaker Coal-mine, one of the oldest mines, on the same day, and several men were seriously injured.

There is a chestnut-tree standing on the slope of Mount Etna, in the island of Sicily, which is said to be the oldest tree of its kind in the world. It is of colossal dimensions, and is named the Hundred Cavaliers, on account of the Queen of Aragon and her court having found shelter beneath its branches. It is nearly two hundred feet in girth, and is thought to be not less than three hundred years old.

A correspondent denies that, in lubricators furnished with a wire or needle, the latter cuts a groove in the shaft, as stated in the illustrated article on "Pneumatic Lubricating Devices" in last week's issue of the American Artisan.

The Danbury *News* says:—"How any unprejudiced man can look upon the present sized penny cake of maple sugar, and claim that the world is growing better, passes our comprehension."

NEW AMERICAN PATENTS.

UNDER this head we shall give a weekly summary of the more important American and English Patents.

CARRIAGE-TOP.—H. M. Colton, Southbridge, Mass.—*April* 30; ante-dated *April* 20.—The most noticeable feature of this improvement is found in the combination with a carriage-top of a reversible extension or awning and bow, the latter being pivoted or hinged to the interior opposite sides of one or more of the bows of the carriage-top, so that it may, when folded up, pass between the sides of the carriage for the purpose of reversing the awning and bringing it within the compass of said carriage-top.

SAFE.—W. Corliss, Providence, R. I.—*April* 20.—Aside from certain novel combinations of parts applied adjunctive to the more essential features, the pr minent characteristics of this invention exist in the use of a spherical rotating door mounted within a spheroidal shell, and adapted to protect the contents of the safe within surfaces which are everywhere spheroidal, and to expose them for convenient access by simply turning the door and its attachments. Also, in a spherical safe having a door released for opening by moving inward.

PRESERVING MEAT AND VEGETABLES.—A. S. Lyman, New York City.—*April* 30.—This inventor claims the process of concentrating meat, fruit, or vegetables by alternately warming in the air and cooling by rapid evaporation in a nearly perfect vacuum. Also, as a new manufacture, meat prepared by the aforesaid process.

STEAM BOILER FOR HEATING BY HOT AIR AND STEAM.—D. Sullivan, Bangor, Maine.—*April* 30.—This comprises the combination, in a tubular boiler of peculiar construction, of water-tubes and air-tubes running through the same, and connecting with a hot-air space formed by a casing which surrounds the boiler proper. Also, the combination of a steam-boiler provided with the ordinary steam-pipes for conducting the steam through the building, with an outer casing and hot-air conductors, so arranged as to enable the steam generated by the boiler and the caloric from the fire to be used independently of each other for heating purposes.

MACHINE FOR FEEDING PLATES TO SHEARING MACHINES.—F. Weshmood, South Wheeling, West Va.—*April* 30.—The gist of this invention lies in the combination with nail plate shears of a peculiar feeding mechanism, supported on a frame that is separate and distinct from the frame of the nail-plate shears, and which is connected to a rack or table by a hinge-joint, so that it may be turned back, and thus leave space between itself and the nail-plate shears for the workman to pass between the two.

CARBURETER.—J. R. Cross, New York City.—*April* 30.—This carbureter is provided with an appliance by means of which the supply of gas is maintained when the carbureter is flooded. It is also furnished with an alarm to denote when it is filled. Among other features, the apparatus also includes a tube and vent applied in combination with the tank and capillary chamber, as a means of allowing vapor to flow from the tank into and through the capillary chamber to the burners, and for regulating the height of fluid in the capillary chamber.

ENAMELING AND COATING ARTICLES WITH RUBBER, GUTTA-PERCHA, ETC.—P. R. Finley, New York City.—*April* 30.—This includes a method of melting, dissolving, or fusing india-rubber or gutta-percha by heat alone, to form a coating or enamel for metallic or other surfaces, and vulcanizing or hardening the surfaces so coat d by the further application of heat. The invention also includes a method of coloring india-rubber or gutta-percha, free from sulphur, when applied as a coating as just specified. Also, imparting utility, economy, and polish by the admixture therewith of certain useful ingredients.

ATTACHING RUBBER ERASER TO LEAD-PENCILS.—T. H. Müller, New York City.—*April* 30.—This invention is constituted by the combination with a wooden lead-pencil of a rubber head, composed of an erasive rubber of suitable shape, surrounded by a stiff sheath of wood, paper, or other suitable material that can be cut with a knife, the two being held together by means of attachment to the pencil, so that the sheath may afford lateral support to the rubber without being cemented to or otherwise directly united with the same.

FLY FRAME FOR PRINTING-PRESSES.—A. Dresend, Philadelphia, Pa.—*April* 30.—Aside from certain minor, but useful, combinations of parts, this invention consists in constructing the "fly" of a series of tapes or cords provided with an automatic intermittent movement, so that the printed sheet will be carried upon the cords or tapes to the proper point of delivery, and then stopped and the sheet delivered.

SEWING-MACHINE FOR BOOTS AND SHOES.—M. J. Stein, New York City.—*April* 30.—This apparatus embraces the combination, with an awl and edge-binder, operating together to bend the edge over the point of the awl, of an opener or separator, arranged to operate in connection with said parts and between the sole and the last, whether said combination be used in connection with either a straight or a curved needle.

ELECTRIC TORCH FOR LIGHTING GAS.—W. T. Batchelder, New York City.—*April* 30.—The more noticeable features of this improvement are found in an electric torch for lighting gas, complete in itself and independent of any connection whatever with the gas-burner or fixtures thereof in generating and liberating the lighting spark. Also, in an electric torch for lighting gas, there is claimed a gas-chamber or deflector for receiving, mixing, and deflecting the escaping gas before it is brought in contact with the lighting spark and away from the burner.

APPARATUS FOR PREPARING ANTHRACINE.—H. J. Fenner and F. Versmann, London, England.—*April* 30.—This comprises the combination of a bar still with a number of pitch retorts and with an anthracine receiver, said retorts being connected with the receiver by means of pipes provided with registering pipes and with suitably arranged branch pipes.

ENAMELING JEWELRY AND OTHER ARTICLES.—G. Krebs, New York City.—*April* 30.—This is a process of producing on sheet-metals or other articles a dull or frozen enameled surface, by spreading the enamel on the surface to be enameled in a dry powdered state, and then heating the article until the enamel becomes partially fluid. Also, a plate of sheet-metal or other article enameled by the aforesaid process.

MANUFACTURE OF ARTIFICIAL STONE.—O. Loew, New York City.—*April* 30.—This artificial stone is constituted by a composition of sand, silica, clay, and resin in certain proportions, and sufficient lime, strontia, baryta, or magnesia to combine chemically with and harden the resin.

MACHINE FOR COILING WIRE SPIRALLY.—T. J. Mayall, Boston, Mass.—*April* 30.—Among the most noticeable features of this apparatus is the combination of peripherically-grooved pressure or bending rollers, and a suitably arranged revolving coiling mandrel. Also, the combination with the revolving coiling mandrel and peripherically-grooved pressure or bending roller, of a cast off or pitch gauge acting in connection therewith. Also, in combination with the aforesaid mandrel, the bending rollers as mounted upon weighted arms or levers, whereby the rollers are made self-adjusting to mandrels of different sizes, are caused to maintain proper pressure upon the mandrel when in operation, and may be lifted away from said mandrel whenever desired.

IRON BUILDING AND ROOF.—C. H. Parker, Boston, Mass.—*April* 30.—This improvement embraces the combination of metallic main ribs or arches, horizontal ties, and convex bearing shoes supporting the bases of said ribs or arches. Also, the combination with the main ribs or arches of purlines bracketed or cantalivered out from the interior opposite sides of any two adjoining ribs to the point of contrary flexure, and independent girders intermediate between and connected by expansion and contraction joints with said purlines. Also, certain novel combinations of parts adjunctive to those just specified.

STEAM-ENGINE.—J. Robertson, Brooklyn, N. Y.—*May* 7.—This invention relates to that class of engines in which the piston or pistons are arranged to move in the arc of a circle. The invention consists in a combination with a curved cylinder, having a central abutment, and valve ports at the abutment, of a curved vibrating or rocking close piston, of lesser area in its transverse section than the cylinder, and glands acting upon packings at the outer ends of the cylinder, for the piston to work through, substantially as hereinafter described, and whereby cheapness of construction is combined with efficiency of action.

BALE-TIE FASTENING.—C. Brown, New York City.—*May* 7.—This invention consists in a wire bale-tie, having one end formed into a double-eye, whereby a double bearing is provided for the other end to draw or pull against, and the liability to cut or break is reduced; also, the combination with such double-eye of a plain opposite end, whereby the cost of construction is reduced about one-half, the tie is adapted to variations in the size of different parts of the bale, so that all the ties on a bale may be subject to uniform tension, greater facility is afforded for untieing the bale, provision is made for using the tie over again, and the liability of the ties to catch or tangle in drawing one from a bundle is obviated.

ROOFING SHINGLE.—T. N. Hickcox, Brooklyn, N. Y.—*May* 7.—This invention consists in a shingle made of straw board, binder's board, or other paper board, rendered water proof and fireproof by being painted with oil paint and sanded.

SAWING MACHINE.—G. Sanford, Bergen Point, N. J.—*May* 7.—The first part of this invention relates to the arrangement in the same machine of a jig-saw and a circular saw; and consists in a novel combination and arrangement of said saws and their appurtenances, and of a table capable of being elevated or lowered to provide for using either saw, whereby a compact and portable machine very handy for light work is obtained; the combination and arrangement on the saw-frame of a bell-crank or angle lever and spring, whereby a very compact arrangement is made to produce a very efficient and uniform tension on the saw.

HANDLE FOR STOVE-COVER LIFTERS.—E. A. Bradslee, Binghamton, N. Y.—*May* 7.—This invention consists in a handle composed of a shell of sheet-metal and a filling of plaster-of-paris or other material of similar nature, which is introduced in a plastic state, and which serves both to secure the lifter in its handle and as a poor conductor of heat. The handle thus produced is very durable, not being liable to be burnt or charred like a wooden one, and besides this is not liable to become so highly heated as to make it difficult to handle.

BROILER.—S. Smith, Brooklyn, N. Y.—*May* 7.—This invention consists in a novel construction of a broiler of two parts fitting together so as to be reversible; their inner face having transversely guttered bars connecting with annular gutters, for the purpose of collecting and saving the gravy or juice expelled from meat in cooking.

OFFICIAL LIST OF PATENTS

ISSUED FROM THE UNITED STATES PATENT OFFICE

For the Week ending May 7, 1872,

AND EACH BEARING THAT DATE.

[*Reported officially for the "American Artisan."*]

126,368.—COMBINED SLEEVE-BUTTON AND LOCKET.—W. C. Almy, Providence, R. I.

126,369.—BELL-CRANK.—M. C. Ames, asgr. to himself, H. R. Morley, and S. D. Bosworth, Hartford, Conn. Ante-dated April 23, 1872.

126,370.—STUMP-EXTRACTOR.—J. R. Ames, Clearfield county, Pa.

126,371.—FANNING-MILL.—C. Altringer, Racine, Wis.

126,372.—PLUMB-LEVEL AND CLINOMETER.—N. Barnum, La Porte, Ind., asgr. of one-half his right to H. C. Goodrich, Chicago, Ill.

126,373.—SHIELD FOR FEED-AIR PIPES FOR HOT-AIR FURNACES.—B. C. Bibb, Baltimore, Md.

126,374.—CHILD'S TABLE-TRAY.—G. G. Bonington, Brooklyn, N. Y.

126,375.—MANUFACTURE OF SOAP.—D. E. Breinig, Brooklyn, N. Y.

126,376.—PULLEY-BLOCK.—T. B. Brown, asgr. of one-half his right to Gerald & Allen, Fairfield, Me. Ante-dated April 30, 1872.

126,377.—DRAUGHT-REGULATOR FOR HOT-AIR FURNACES.—F. E. Chatard, Jun., Baltimore, Md.

126,378.—PAPER-BOX MACHINE.—G. R. Clarke, Pompton, N. J., asgr. to Peter V. Husted, New York City.

126,379.—STEAM VALVE AND PORT FOR ENGINES.—John Cooke, Paterson, N. J.

126,380.—SASH-HOLDER.—E. Culver, Shelburne Falls, Mass.

126,381.—PLANING MACHINE.—G. B. Durkee, Chicago, Ill.

126,382.—BRAIDER FOR SEWING-MACHINES.—E. B. Ellicott and W. Prince, Washington, D. C.

126,383.—COMPOUND STEAM-ENGINE.—C. E. Emery, New York, City.

126,384.—DEVICE FOR CUTTING OFF BOLTS.—T. J. Emery, Charlestown, Mass.

126,385.—MANUFACTURE OF MOLDINGS FOR PICTURE-FRAMES, ETC.—A. C. Engert, County of Middlesex, England.

126,386.—HORSE-POWER.—A. B. Farquhar, York, Pa.

126,387.—CARD-STRIPPING MACHINERY.—J. F. Foss, asgr. to himself and J. N. Pierce, Lowell, Mass.

126,388.—BOMB HARPOON.—C. Freeman, Brewster, Mass.

126,389.—HUB FOR CARRIAGE-WHEELS.—J. C. Garretson, Marlbland, N. Y.

126,390.—MACHINE FOR ROLLING SHEET-METAL.—J. Hall, Wheeling, West Va.

126,391.—DIFFERENTIAL PULLEY-BLOCK.—C. Hall and E. Hubner, New York City.

126,392.—GRAIN-MEASURING ATTACHMENT TO THRASHING MACHINES.—J. Hemingway, Burnside, Ill.

126,393.—COMBINED FURNACE AND TEMPERING OVEN.—R. L. Hewett, Worcester, and A. F. Hewitt, Milbury, Mass.

126,394.—BALING PRESS.—F. A. Huntington and J. F. Carter, San Francisco, Cal. Ante-dated April 24, 1872.

126,395.—BIT-BRACE.—W. A. Ives, New Haven, Conn.

126,396.—GIRDER.—P. H. Jackson, New York City.

126,397.—MEDICAL COMPOUND FOR THE TREATMENT OF CONSUMPTION.—N. C. Jarrell, High Point, N. C.

126,398.—SAFETY ATTACHMENT TO STEAM-BOILERS.—H. Kaempf, Newark, N. J. Ante-dated April 20, 1872.

126,399.—BLACKING-SPREADER.—Hugh S. Kerr, Philadelphia, Pa.

126,400.—GRAIN-CLEANER.—J. A. Krake, Alden, N. Y.

126,401.—CAR-COUPLING.—E. Lane, Old Town, asgr. to himself and M. H. Angell, Bangor, Me.

126,402.—ROTARY VALVE.—A. Lawrence, Lowell, Mass.

126,403.—CASING-CUTTERS FOR REMOVING CASINGS FROM ARTESIAN WELLS.—P. H. Lawrence and J. H. Luther, Petroleum Center, Pa.

126,404.—BOLT.—P. Lecloux, Dijon, France.

126,405.—BALING PRESS.—L. W. Liles, Roanoke, Ala.

126,406.—IRON-FENCE POST.—M. M. Manly, asgr. to himself and S Sellers, Philadelphia, Pa.

126,407.—SAW.—T. P. Marshall, Trenton, N. J. Ante-dated April 19, 1872.

126,408.—TOOL FOR MATTING METAL SURFACES.—D. Mosman West Meriden, Conn.

126,409.—POWDER FOR CLEANING METALS, ETC.—J. H. Musgrave and J. M. Beidel, Chambersburg, Pa.

126,410.—LOOM WEFT STOP MECHANISM.—T. Naylor, Manchester, Iowa.

126,411.—MANUFACTURE OF WHIPS.—G. P. Overin, New York City.

126,412.—CULTIVATOR.—J. Rebman, Manheim Township, Pa.

126,413.—FENCE.—R. A. Riggs, Salem, Oregon.

126,414.—Toy Steamboat.—E. P. Ryder, Brooklyn, N. Y.

126,415.—Baling Press.—C. H. Schnelle, St. Louis, Mo.

126,416.—Hulling Machine.—W. Seck, Frankfort, Prussia.

126,417.—Iron Fence.—S. Sellers and W. Beschke, Philadelphia, Pa.; said Beschke assignor to said Sellers.

126,418.—Composition for deodorizing and preparing Fertilizers.—T. Sewell, Washington, assignor to F. P. Sawyer, Georgetown, D. C. Ante-dated April 23, 1872.

126,419.—Vapor-burner.—W. H. Smith, Brooklyn, N. Y.

126,420.—Vapor-burner.—W. H. Smith and L. Fischer, Brooklyn, N. Y.

126,421.—Mechanical Movement.—C. R. Squier, Cleveland, Ohio. Ante-dated May 1, 1872.

126,422.—Rock-drill.—M. Stannard and J. R. Reynolds, Hartford, Conn., assgrs. to A. T. Rand, Brooklyn, N. Y.

126,423.—Cutting-nipper.—W. X. Stevens, East Brookfield, Mass.

126,424.—Apparatus for chlorinating and leaching Ores.—M. H. Stowe, Washington, D. C.

126,425.—Hand-clamp.—S. L. Thompson, Lowell, Mass.

126,426.—Fruit Corer and Slicer.—C. E. Thurston and J. H. Wilkinson, South Newmarket, N. H.

126,427.—Balanced Slide-valve.—R. Tremain, Syracuse, N. Y.

126,428.—Covering for Steps of Buildings.—A. A. Tremeschin, New York City.

126,429.—Support for Chairs or Stools.—H. Wadsworth, Duxbury, Mass.

126,430.—Combined Kneeling-stools and Book-holders.—G. Watson, assgr. of one-half his right to W. C. Maybury and E. F Conely, Detroit, Mich.

126,431.—Radiator for Stoves.—C. Williams, Vineland, N. J. Ante-dated April 20, 1872.

126,432.—Handle-strap for Traveling-bags.—A. Alexandre, New York City.

126,433.—Furniture-caster.—A. C. Arnold and O. G. Hanschildt, Norwalk, Conn.

126,434.—Machine for bending the Shanks of Boots and Shoes.—H. Barnes, Brookfield, Mass.

126,435.—Baling-press.—C. J. Barney, Rockport, Ind.

126,436.—Ruffling Machine.—S. E. Barney and E. Hubbell, assgr. to the Elm City Company, New Haven, Conn.

126,437.—Lamp-snuffer and Extinguisher.—M. L. Battle, Bainbridge, Ga.

126,438.—Planter.—W. Beall, Hainesville, West Va.

126,439.—Dividing Apparatus for condensing Carding Machines.—E. Bede, Verviers, Belgium.

126,440.—Fruit-box.—C. A. Blair, New Britain, Conn.

126,441.—Motive-power for Sewing-machines.—A. Bouchard, New Orleans, La.

126,442.—Saw-mill.—H. W. Bullard, assgr. to himself and J. H. Dudley, Poughkeepsie, N. Y.

126,443.—Pruning-shear.—R. Bullard, Litchfield, Mich.

126,444.—Regulator to Protect Pipes from Percussion.—E. A. Chameroy, Paris, France.

126,445.—Door-check.—W. O. Clough, Lexington, Ky.

126,446.—Breech-loading Fire-arm.—J. W. Cochran, New York City.

126,447.—Wheel-plow.—J. Cochrane, Indianola, Iowa.

126,448.—Pencil-case.—W. H. Davis, Hartsville, Ind.

126,449.—Car for Street Railways.—E. L. Dorsey, Washington, D. C.

126,450.—Shoe.—J. J. Drown, Plattsburg, N. Y.

126,451.—Apparatus for temporarily increasing the Pressure in Gas-pipes.—G. S. Dunbar, Pittsfield, Mass.

126,452.—Baby-walker.—G. Euell, Guttenburg, N. J.

126,453.—Railway-ties.—E. J. Fenn, Medina, Ohio.

126,454.—Wood Pavement.—Z. E. Fobes, Troy, N. Y., assgr. of one-half his right to H. Patchin, Bennington, Vt.

126,455.—Grain-drier.—J. Guardiola, Chocolá, Central America.

126,456.—Carpet-fastener.—C. Harting, Washington, D. C.

126,457.—Water-bowl.—S. Hawson, Jersey City, N. J., and T. Sweeney, Brooklyn, N. Y.

126,458.—Reversible Shade-fixture.—W. B. Hazzard, Philadelphia, Pa.

126,459.—Balanced Slide-valve.—C. H. Hutchinson, Concord, N. H.

126,460.—Car-coupling.—W. M. Inge and E. P. Wheeler, Corinth, Miss.

126,461.—Apparatus for elevating and immersing Vessels.—J. Jacobs, West Salem, Wis.

126,462.—Manufacture of Fuses.—G. F. James, Manchester, England.

126,463.—Washing Machine.—W. G. Knowles, Jamestown, R. I.

126,464.—Window-blind Slat.—A. Kohler, Williamsburg, N. Y.

126,465.—Spade.—J. Lake and A. W. Elliott, North Easton, Mass.

126,466.—Apparatus for supplying Locomotive Tenders with Fuel.—H. C. Land, Garlandville, Miss.

126,467.—Attachment for Sewing-machines.—G. G. Lawrence and A. A. Wood, Fitchburg, Mass.

126,468.—Bread-cutter.—S. H. Martin and J. S. Williams, Mount Vernon, N. Y.

126,469.—Flag-hoisting Apparatus.—J. W. Mackenzie, San Francisco, Cal.

126,470.—Punch and Die for finishing Umbrella Staff Collars.—R. Marshall, Philadelphia, Pa.

126,471.—Land Roller.—H. W. Mathews, Frenchtown, N. J.

126,472.—Steam-generator.—W. V. McKenzie, Rahway, N. J.

126,473.—Gas-heater.—A. H. Mershon, assgr. to himself and G. B. Mershon, Philadelphia, Pa.

126,474.—Glove for husking Corn.—A. C. Meyn, Jerseyville, Ill. Ante-dated May 1, 1872.

126,475.—Ash-sifter.—G. F. Millard, Pittsfield, Mass.

126,476.—Water-leg of Steam-boiler Fire-boxes.—R. Montgomery, New York City.

126,477.—Alarm Letter-box.—S. H. Morris, Charlestown, Mass.

126,478.—Wash-basin with Urinal Attachments.—J. L. Mott, Mott Haven, N. Y.

126,479.—Boot for Horses.—P. Murray and F. Koch, Morrisania, N. Y.

126,480.—Baling Press.—R. L. Myers and T. H. B. Myers, Washington, N. C.

126,481.—Advertising Calendar.—R. C. Ogden, New York City.

126,482.—Lock-nut.—J. A. Peabody and A. F. Champlin, assgrs. of one-fourth their rights to T. H. Browning, Westerly, R. I.

126,483.—Tension Device for Fliers of Rope Machines.—H. Perkins, Mansfield, Mass.

126,484.—Derrick.—W. J. Perkins, Louisville, Ky.

126,485.—Car-seat.—W. G. Philips and N. Coleman, Newport, Del.

126,486.—Electric Telegraph Apparatus.—F. L. Pope, Elizabeth, N. J.

126,487.—Cotton-planter.—J. A. Pope and W. L. D. Pope, Charlotte, N. C.

126,488.—Needle Bar for Sewing-machine.—G. M. Pratt, assgr. to the Finkle & Lyon Manufacturing Company, Middletown, Conn.

126,489.—Boot-heel.—F. Richardson and F. Hacker, assgrs. to Reversible Boot-heel Company, Providence, R. I.

126,490.—Boot-heel.—F. Richardson and F. Hacker, assgrs. to Reversible Boot-heel Company, Providence, R. I.

126,491.—Machine for filling Metallic Boot-heel Shells with Wood.—F. Richardson, F. Hacker, and J. A. Blake, assgrs. to Reversible Boot-heel Company, Providence, R. I.

126,492.—Thrashing Machine.—F. W. Robinson, Richmond, Ind.

126,493.—Grain-screen.—D. D. Schamp, Pleasant Run, N. J.

126,494.—Car-coupling.—C. S. Servoss, Wilmington, N. C.

126,495.—Die for upsetting Metal Rods.—M. Seward, New Haven, Conn.

126,496.—Lifting-jack.—R. T. Smart and R. T. Smart, Jun., Troy, N. Y.

126,497.—Horseshoe.—J. Stickney, Manchester, N. H.

126,498.—Photographic Camera.—J. Stock and J. Stock, New York City.

126,499.—Tobacco-drying House.—J. H. Streeter, Hinsdale, N. H.

126,500.—Casket-handle.—C. Strong, Winsted, Conn.

126,501.—Marking-pot.—J. L. Tarbox, New York City.

126,502.—Armored Can.—W. F. Thompson, Toledo, Ohio.

126,503.—Relieving Oil-stills of Gas, etc.—S. Van Syckel, Titusville, Pa.

126,504.—Manufacture of Soap.—T. R. Walker, Tymochtee, Ohio.

126,505.—Clutch for Telegraph-transmitting and Paper-feeding Apparatus.—G. C. Wessman, Brooklyn, N. Y.

126,506.—Pipe-wrench.—W. C. Westerfield, Fairbury, Ill.

126,507.—Plow.—F. R. Willson, Columbus, Ohio.

126,508.—Car-axle Lubricator.—M. W. Woodruff, Camillus, assgr. to himself and C. C. Bradley, Jun., Syracuse, N. Y.

126,509.—Pump.—A. C. Baldwin, assgr. to himself and S. W. Lloyd, Washington, D. C.

126,510.—Apparatus for Manufacture of Gas from Oil.—M. J. Barry, Washington, D. C.

126,511.—Process and Apparatus for curing Corn and other Grains.—H. H. Beach, Rome, N. Y.

126,512.—Composition-handle for Stove-cover Lifters.—Emilie A. Beardsley, assgr. of one-half of her right to E. M. Haynes, Binghamton, N. Y.

126,513.—Cultivator.—C. Billup, Norfolk, Va.

126,514.—Inkstand.—A. W. Brinkerhoff, Upper Sandusky, Ohio.

126,515.—Wire Bale-tie Fastening.—C. Brown, New York City.

126,516.—Music-leaf Turner.—C. P. Brown, assgr. to himself, J. O. Bates, Spring Lake, and W. M. Robinson, Fruit Port, Mich.

126,517.—Artificial Denture.—F. C. Brown, Palmyra, N. Y.

126,518.—Soap-holder.—J. A. Camp, Sandusky, Ohio.

126,519.—Carpenter's Plane.—O. R. Chaplin, Boston, assgr. to himself and C. H. Ballard, Worcester, Mass.

126,520.—Grain-binder.—E. Chapman, assgr. to himself, A. K. Williams, J. M. Williams, and C. H. Chadbourn, Rochester, Minn.

126,521.—Wood Pavement.—G. H. Chinnock, New York City, assgr. to C. E. Evans, Brooklyn, N. Y.

126,522.—Device for boring Spherical Seats.—W. E. Cooper, Hornellsville, N. Y.

126,523.—Machine for washing Grain.—G. Copeland, Denver, Col. Ter.

126,524.—Pulley.—J. J. Cowell, Newark, N. J.

126,525.—Steam Water-ejector.—R. D. Cox and W. F. Cox, Philadelphia, Pa.

126,526.—Device for overcoming Dead-centers.—J. Coy, Oswego, N. Y.

126,527.—Try-square.—H. Disston and J. Morss, Philadelphia, Pa.

126,528.—Type-wheel for Printing-telegraphs.—T. A. Edison, Newark, N. J., assgr. to Gold and Stock Telegraph Co., New York City.

126,529.—Type-wheel for Printing-telegraphs.—T. A. Edison, Newark, N. J., assgr. to Gold and Stock Telegraph Co., New York City.

126,530.—Printing-telegraph.—T. A. Edison, Newark, N. J., assgr. to Gold and Stock Telegraph Co., New York City.

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126,535.—Printing-telegraph.—T. A. Edison, Newark, N. J., assgr. to Gold and Stock Telegraph Co., New York City.

126,536.—Steam-pump.—H. Epping, assgr. to himself and N. Winter, Pittsburg, Pa.

126,537.—Seam for Boots and Shoes.—L. H. Farnsworth, Hudson, Mass.

126,538.—Machine for turning Shafting.—J. Fensom, Toronto, Canada.

126,539.—Scissors-sharpener.—E. Fuller, Biddeford, Maine, assgr. to A. L. Fuller & Co., Worcester, Mass.

126,540.—Rotary Pump.—J. S. Godfrey, Leslie, Mich., assgr. to himself and S. M. Loveridge, Pittsburg, Pa.

126,541.—Stand for displaying Collars and Neck-ties.—S. S. Gray and C. E. Staniels, Boston, Mass.

126,542.—Milk-strainer.—H. Hassenpflug, Huntingdon, Pa.

126,543.—Machine for cutting and punching Metal.—A. L. Hastings, assgr. to himself and C. R. Hastings, Horton, Iowa.

126,544.—Combination Tool.—D. Heaton, Providence, R. I.

126,545.—Strengthening Steam-boiler.—J. Hebden, Louisville, Ky.

126,546.—Puddling and Reverberatory Furnace for the Manufacture of Iron and Steel.—I. Hersey, Fort Edward, N. Y.

126,547.—Shingle for Roofs and Walls of Buildings.—T. N. Hickcox, Brooklyn, N. Y. Ante-dated April 26, 1872.

126,548.—Piston.—H. S Hopkins, assgr. to himself and Sewall Day & Co., Boston, Mass.

126,549.—Rein-holder for Carriages.—L. D. Howard, St Johnsbury, Vt.

126,550.—Bleaching Pea-nuts.—F. M. Ironmonger, Norfolk, Va.

126,551.—Medical Compound or Ointment.—W. H. Jones, assgr. of one-half his right to J. A. Corbitt, Henry County, Ala.

126,552.—Solidifying Oils.—C. A. Jordery, Paris, France.

126,553.—Pipe-coupling.—D. C. Kellam, Pontiac, Mich.

126,554.—Car-coupling.—W. Kenyon, Crawfordsville, Ind.

126,555.—Coffee-pot.—R. H. Kuper, New York, assgr. of one-half of his right to P. B. Reid, Lockport, N. Y.

126,556.—Awning-frame.—J. W. Loane, assgr. to himself and C. E. Loane, Baltimore, Md.

126,557.—Process of Preserving Grated Horse-radish.—J. G. Lunz, Chicago, Ill.

126,558.—Combined Burglar-alarm and Door-fastener.—W. W. Marston, New York City.

126,559.—Baggage-check.—J. H. McAlvin, Cedar Rapids, Iowa.

126,560.—Churn.—W. McKeever, assgr. to himself and G. A. Schoppert, Staunton, Va.

126,561.—Fruit-jar.—T. McSpedon and J. Steger, New York City.

126,562.—Water-wheel.—M. Millard, Franklin, Ohio.

126,563.—Milk-cooler.—N. W. Miller, East Randolph, N. Y.

126,564.—Buckle and Loop for Trunks.—J. S. Mitchell and D. K. Benedict, Newark, N. J.

126,565.—Corn-husker and Picker.—S. H. Mitchell, Lacon, Ill.

126,566.—Dish-washer.—M. K. Morris, Louisville, Ky.

126,567.—Grain-scourer.—G. S. Newman, Liberty Mills, Va.

126,568.—Breech-loading Firearm.—F. E. M. Nillus, Havre, France.

126,569.—Loom-shuttle.—L. L. Northup, Olneyville, assgr. of one-half of his right to J. P. Manton, Providence, R. I. Ante-dated April 25, 1872.

126,570.—Street-scraper.—C. Osgood, Cape Elizabeth, assgr. to T. Ripley, Manchester, Maine. Ante-dated April 24, 1872.

126,571.—Hinge.—J. K. Otis, East Cambridge, assgr. to himself and F. W. Nichols, Lynn, Mass.

126,572.—Lubricator for Steam-engines.—C. H. Parshall, Detroit, Mich.

126,573.—Mole-trap.—C. Polley, McMinnville, Tenn.

126,574.—Pump.—G. W. Preston, Clyde, Ohio.

126,575.—Apparatus for attaching Artificial Teeth to the Pyroxyline Base.—A. S Pursell, Indianapolis, Ind., assgr. to himself and J. A. Troutman, Seneca Falls, N. Y.

126,576.—Oscillating Steam-engine.—J. Robertson, Brooklyn, N. Y.

126,577.—Street-lamp.—J. H. Robinson, Washington, D. C.

126,578.—Apparatus for Dyeing.—G. M. Rohrbacher, Philadelphia, Pa. Ante-dated May 1, 1872.

126,579.—Spring Bed-bottom.—W. P. Sadler, Springfield, Ill.

126,580.—Sawing Machine.—G. Sanford, Bergen Point, N. J.

126,581.—Fire-escape.—H. G. Sedgwick, Warsaw, Mo.

126,582.—Graveling Attachment for Harvesters.—C. C. Saults, Waverly, Iowa.

126,583.—Hasp-lock.—T. Slaight, Newark, N. J.

126,584.—Clothes-wringer.—M. K. Smille and W. Cooley, Waterbury, Vt.

126,585.—Reversible Broiler.—S. Smith, Brooklyn, N. Y.

126,586.—Camera-stand.—E. P. Spahn, Newark, N. J.

126,587.—Apparatus for the Manufacture of Illuminating-gas.—J. H. Spang, Dayton, Ohio.

126,588.—Mitering Machine.—G. M. Stevens, Portland, Me.

126,589.—Balanced Slide-valve.—A. Stirling, Troy, N. Y.

126,590.—Soldering Furnace.—G. A. Townsend, Columbus Ohio.

126,591.—Hair-restorative.—P. Trautwein, Brooklyn, N. Y.

126,592.—Process for preserving Wooden Pavements from Rot.—A. B. Tripler, Philadelphia, Pa.

126,593.—Spring-hinge.—B. Turner, London, Eng.

126,594.—Trussed Axle for Lumber Wagons.—G. H. Turner, and J. Conde, Flint, Mich.; said Conde assgr. to said Turner W. H. Pierson, and J. Algoe.

126,595.—Folding Chair.—P. B. Viele, Rochester, N. Y.

126,596.—Heating-stove.—S. D. Vose, Milwaukee, Wis.

126,597.—Emery Wheel.—W. T. Vose, Newtonville, Mass.

126,598.—Machine for goring Gaiters.—J. Walden, Newark N. J.

126,599.—Bed-seat for Invalids.—J. G. Waterhouse, East Saugus, Mass.

126,600.—Aerated Steam-generator.—L. W. Werner, St. Louis, Mo.

126,601.—Printing-ink.—J. C. White, Quincy, Ill.

126,602.—Band-sawing Machine.—B. D. Whitney, Winchendon, Mass.

126,603.—Machine for sawing Staves.—B. D. Whitney, Winchendon, Mass.

126,604.—Apparatus for pumping and measuring Liquids.—E. E. Wilder, Lowell, Mass.

126,605.—Bee-hive.—J. Williams, Bean's Station, Tenn.

126,606.—Miner's Lamp.—W. C. Winfield, assgr. to himself, J. R Winfield, and T. A. Winfield, Hubbard, Ohio.

126,607.—Field Artillery.—S. W. Wood, Cornwall, N. Y.

126,608.—Machine for tapering Metallic Cartridges.—S. W. Wood, Cornwall, N. Y.

126,609.—Machine for tapering Cartridge-shells.—S. W. Wood, Cornwall, N. Y.

126,610.—Machine for tapering Cartridge-shells.—S. W. Wood, Cornwall, N. Y.

126,611.—Machine for tapering Cartridge-shells.—S. W. Wood, Cornwall, N. Y.

126,612.—Machine for tapering Cartridge-shells.—S. W. Wood, Cornwall, N. Y.

126,613.—Method of reinforcing Metallic Cartridge-heads.—S. W. Wood, Cornwall, N. Y.

126,614.—Lubricating-pellet for Firearms.—S. W. Wood, Cornwall, N. Y.

126,615.—Lubricating Wad for Firearms.—S. W. Wood, Cornwall, N. Y.

126,616.—FANNING MILL.—B. Wright and J. C. Hogaboam, Hudson, Mich.
126,617.—WOOD PAVEMENT.—A. Wyckoff, Elmira, N. Y.
126,618.—BRICK MACHINE.—J. D. Culver, St. Louis, Mo., asgr. of part of his right to T. Elwood and C. H. Thompson, Cleveland, Ohio.

RE-ISSUES.

4,888.—MANUFACTURE OF WATERPROOF HOSE.—E. M. Chaffee, Providence, R. I. Patent No. 58,377, dated Oct. 2, 1866.
4,889.—TOE-CALK FOR HORSESHOES.—G. Custer, Monroe, Mich. Patent No. 101,831, dated April 12, 1870.
4,890.—MACHINE FOR THE MANUFACTURE OF PNEUMATIC GAS.—A. D. Bell, asgr. to J. W. Stow, San Francisco, Cal. Patent No. 112,111, dated Feb. 28, 1871.
4,891.—CHILD'S CORSET.—Harriet G. Emery and Margaret C. Fuller, asgrs. to Harriet G. Emery, Boston, Mass. Patent No. 124,891, dated March 26, 1872.
4,892.—SAFETY-VALVE.—H. S. Jewell and F. Steele, Brooklyn, N. Y. Patent No. 123,176, dated Jan. 30, 1872.
4,893.—WEATHER-STRIP.—L. M. Lawless, Geneseo, Ill. Patent No. 118,730, dated Sept. 5, 1871.
4,894.—STEAM-ENGINERY FOR SURFACE CONDENSERS.—W. A. Lighthall, New York City. Patent No. 89,156, dated April 20, 1869.
4,895.—GAS APPARATUS.—J. H. Steiner, Cincinnati, Ohio Patent No. 125,496, dated April 9, 1872.
4,896.—METHOD OF FASTENING COTTON-BALE TIES.—C. Swett, Martinsville, Miss., asgr. to C. G. Johnsen, New Orleans, La. Patent No. 59,144, dated Oct. 23, 1866; ante-dated April 23, 1866.
4,897.—FURNACE FOR ROASTING, BURNING, SMELTING, AND TREATING ORES.—(Div. A.)—J. D. Whelpley and J. J. Storer, Boston, Mass. Patent No. 41,250, dated Jan. 12, 1864.
4,898.—PROCESS OF ROASTING, BURNING, AND TREATING METALLIC ORES AND MINERALS.—(Div. B.)—J. D. Whelpley and J. J. Storer, Boston, Mass. Patent No. 41,251, dated Jan. 12 1864.

DESIGNS.

5,837.—CARPET-PATTERN.—W. De Hart, Amsterdam, asgr. to J. Barber & Sons, Auburn, N. Y.
5,838.—BURIAL-CASKET.—G. Hasecoster, asgr. to J. M. Hutton & Co., Richmond, Ind.
5,839.—BUTTER-DISH.—J. Hill, asgr. to The Meriden Silver-Plate Co., West Meriden, Conn.
5,840.—METALLIC GRATING.—J. K. Ingalls, Starkey, N. Y.
5,841.—CARPET-PATTERN.—L. Jullien, Passy, France, asgr. to J. Wild & Co., New York City.
5,842.—CARPET-PATTERN.—H. Robinson, Halifax, England, asgr. to J. Wild & Co., New York City.
5,843.—RANGE-STOVE.—G. Smith and H. Brown, Philadelphia, asgrs. to E. S. Shantz and O. B. Keeley, Springfield, Pa.
5,844.—BURIAL-CASKET.—F. Weseman, Brooklyn, asgr. to Taylor & Co., New York City.
5,845.—GARDEN-VASE.—R. Wood, Philadelphia, Pa.

TRADE-MARKS.

799.—TOYS.—Althof, Bergmann & Co., New York City.
800.—LINIMENT.—C. F. Brown Chemical Co., New York City.
801.—LEATHER.—J. Davis & Son, Pawtucket, R. I.
802.—MARQUETRY.—J. Dill, Boston, Mass.
803.—COFFEE, SPICES, BAKING POWDER, ETC.—E. H. Garbutt & Co., New York City.
804.—WRITING-PAPER.—J. M. Goodall, Camdentown, London, Eng.
805.—POLISHING-BRICK.—T. T. Luscombe & Co., St. Louis, Mo.
806.—MEDICINE.—W. Renne & Sons, Pittsfield, Mass.
807.—PERFUME.—J. Rose, Dover, N. H.
808.—MEDICINE.—Russell & Seabold, St. Louis, Mo.
809.—SHIRTS, DRAWERS, ETC.—Thalheimer & Hirsch, Philadelphia, Pa.
810.—TOBACCO.—J. and L. Whorley, Nashville, Tenn.

EXTENSIONS.

20,051.—COTTON-GIN.—J. Du Bois, April 27, 1858; re-issued to J. C. Du Bois, asgr., June 28, 1870, numbered 4,047.
20,091.—FLY-TRAP.—W. Riley. April 27, 1858.
20,056.—PENCIL-SHARPENER.—W. K. Foster. April 27, 1858.
20,106.—WORM-AIR REGISTER AND VENTILATOR.—E. A. Tuttle. April 27, 1858.
20,111.—APPARATUS FOR DAMPING PAPER.—C. A. Waterbury April 27, 1858.
20,120.—COTTON-GIN.—J. N. Wilson and G. W. Payne. April 27, 1858. (Dorcas E. Beadle, administrator of said Wilson, deceased.)
20,086.—COTTON-GIN.—S. R. Parkhurst. April 27, 1858.
20,173.—SEWING-MACHINE.—E. H. Smith. May 4, 1858.
20,136.—STEAM-ENGINE.—D. Barnum, May 4, 1858.
20,180.—HARVESTER.—(Div. A.)—L. Miller. May 4, 1858; re-issued to C. Aultman & Co., asgrs., July 19, 1859, numbered 764.
20,180.—HARVESTER.—(Div. B.)—L. Miller. May 4, 1858; re-issued to C. Aultman & Co., asgrs., July 19, 1859, numbered 765.
20,180.—HARVESTER.—(Div. C).—L. Miller. May 4, 1858; re-issued to C. Aultman & Co., asgrs., July 19, 1859, numbered 766.
20,181.—HARVESTER.—(Div. A.)—L. Miller. May 4, 1858; re-issued to C. Aultman & Co., asgrs., July 19, 1859, numbered 777.
20,181.—HARVESTER.—(Div. B.)—L. Miller. May 4, 1858; re-issued to C. Aultman & Co., asgrs., July 19, 1859, numbered 778.

APPLICATIONS FOR EXTENSIONS.

OPPONENTS of extensions must file *written* objections in the Patent Office at least 20 days before the day-of-hearing; and on that day, at noon, they must appear personally, or by proxy, at the Patent Office, and state the reasons of their opposition. All testimony—*pro* or *con*—must be taken and transmitted in accordance with the official rules, which will be furnished on application. The under-named patentees have recently petitioned for extensions (for seven years) of patents granted to them in the year 1858:—

BEULAH S. SAMPSON, administratrix of BLANEY E. SAMPSON, deceased, Boston, Mass.—*Pole-coupling for Railroad-cars.*—Patented July 27, 1858; and re-issued Feb. 21, 1860; testimony will close on June 25, next; last day for filing arguments and examiner's report, July 5; day-of-hearing, July 10.

ROBERT DICK, Buffalo, N. Y.—*Accountant Labels for Periodicals.*—Patented Oct. 4, 1859; ante-dated July 26, 1858; and re-issued, May 31, 1864; testimony will close on June 25, next; time for filing arguments and examiner's report July 5; day-of-hearing, July 10.

ELI WHEELER, Elmira, N. Y.—*Sleeping-car for Railroads.*—Patented Aug. 3, 1858; and re-issued Sept. 18, 1860; testimony will close on July 2, next; last day for filing arguments and examiner's report, July 2; day-of-hearing, July 17.

AUSTIN G. DAY, Seymour, Conn.—*Treatment of Caoutchouc.*—Patented Aug. 10, 1858; and re-issued Nov. 9, 1858; testimony will close on July 9, next; last day for filing arguments and examiner's report, July 19; day-of-hearing, July 24.

SILAS S. PUTNAM, Neponset, Mass.—*Machine for forging Nails.*—Patented August 17, 1858; testimony will close on July 16, next; last day for filing arguments and examiner's report, July 26; day-of-hearing, July 31.

MOSES G. FARMER, Salem, Mass.—*Method of sending and receiving Messages simultaneously over the same Telegraph Wire.*—Patented August 31, 1858; testimony will close on July 30, next; last day for filing arguments and examiner's report, August 9; day-of-hearing, Aug. 14.

JOHN R. HENSHAW, Middletown, Conn.—*Self Mousing Hook.*—Patented Oct. 26, 1858; re-issued on Feb. 6, 1866; and again re-issued Feb. 11, 1868; testimony will close on Sept. 24, next; time for filing arguments and examiner's reports, Oct. 4; day-of-hearing, Oct. 9.

ANSWERS TO CORRESPONDENTS.

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L. S., OF COL.—Coarse copper containing silver is taken from the furnace, after roasting to a bright red-heat, pulverized, and then roasted with salt, which changes the silver to chloride. This is treated with quicksilver, and the silver separated from the resultant amalgam by retorting. Impurities are then removed from the silver by the ordinary process of cupellation.

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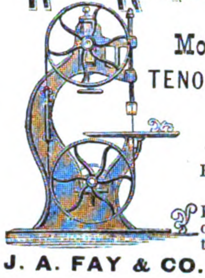

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VOLUME XIV. New Series. | NUMBER 21. | NEW YORK, MAY 22, 1872. | $3 00 PER ANNUM IN ADVANCE. SINGLE COPIES, FIVE CENTS.

Sanborn's Improvements in Railway Rails.

THE improvement of railway rails has been a matter upon which much study and mechanical genius have been expended. Up to the present date no other form has attained the popularity and developed the usefulness of that known as the T rail. Yet this rail is not perfect. The square joints employed necessitate keeping the ends a little apart to allow for expansion by heat. This gives rise to percussive action on the part of the wheels upon the solid ends of the rails, which batters them, and ultimately necessitates their repair, or replacement by new rails.

The object of the invention illustrated herewith is to impart to rails, not only at the ends, but throughout their whole length, such a degree of elasticity as shall enable them to resist the shocks to which all rails are subjected. It is evident that if, with sufficient sustaining power, this elasticity can be secured, the durability of rails would thereby be much increased.

The general principle of the construction is the making of tubular rails of such a configuration that the application of the load they are desired to sustain shall cause them to yield within certain proper limits. When these limits are reached, further movement is checked by the parts of the rails bearing against each other, or against the ties which support their bases.

The invention is protected by three patents, respectively bearing date Aug. 8, 1871, Dec. 12, 1871, and March 26, 1872, issued to Mr. Rufus S. Sanborn, of Rockford, Ill.

The form of the rail, as first constructed and upon which a separate patent was granted, is shown in Figs. 1 and 2, in which A represents the tubular T rail, and B a connecting tube. The general form of the upper portion of the rail is round. It is slightly flattened on the top to give a good tread to the wheels of locomotives and cars.

At the neck of the rail the sides approach to about one-quarter of an inch of each other, as shown. From thence downward the sides diverge in an easy curve till they meet the base, the latter being slightly arched.

The elastic cylindrical joint, B, is open longitudinally at the bottom, as shown. It is compressed when inserted in the juxtaposed ends of the rail, and when allowed to expand is claimed to bind the rails securely, while it is capable of yielding simultaneously with them and to the same degree.

When the rail is subjected to pressure at the top, the sides at the neck approach each other, even to touching, if the pressure should be sufficient. The arch in the cylindrical head of the rail also is changed in form by the approximation of the sides of the neck, rendering this form slightly elongated vertically, so that its strength is increased without sensibly affecting the bearing surface on the top.

The patent of Dec. 12, 1871, relates to the form of rail shown in Fig. 3. It having been found difficult to manufacture the rail in the form shown in Fig. 1, on account of the weld necessary to join the base to the upper portion, these parts were made separate and united by a lap joint as shown, the engraving showing the construction of this joint so plainly that it needs no elaborate description.

The elastic joint, C, Fig. 3, is the same as that shown in Figs. 1 and 2. Fig. 4 shows still another modification, patented March 12, 1872. In this the lower edges of the sides are not recurved as shown in Fig. 3, and the elastic connecting-joint, C, is made of corresponding form to the body of the rail, its edges being brought down flush to the base, B.

The heads of the rails in Figs. 3 and 4 are made flatter on the top than on the original rail, which gives a better tread to the wheels. The construction of the elastic spring-joint, as shown in Fig. 4, adds a third source of elasticity and strength to those above described, and affords a better connection, as by running it to the bottom it keeps all the portions of the juxtaposed rail ends in proper relation to each other.

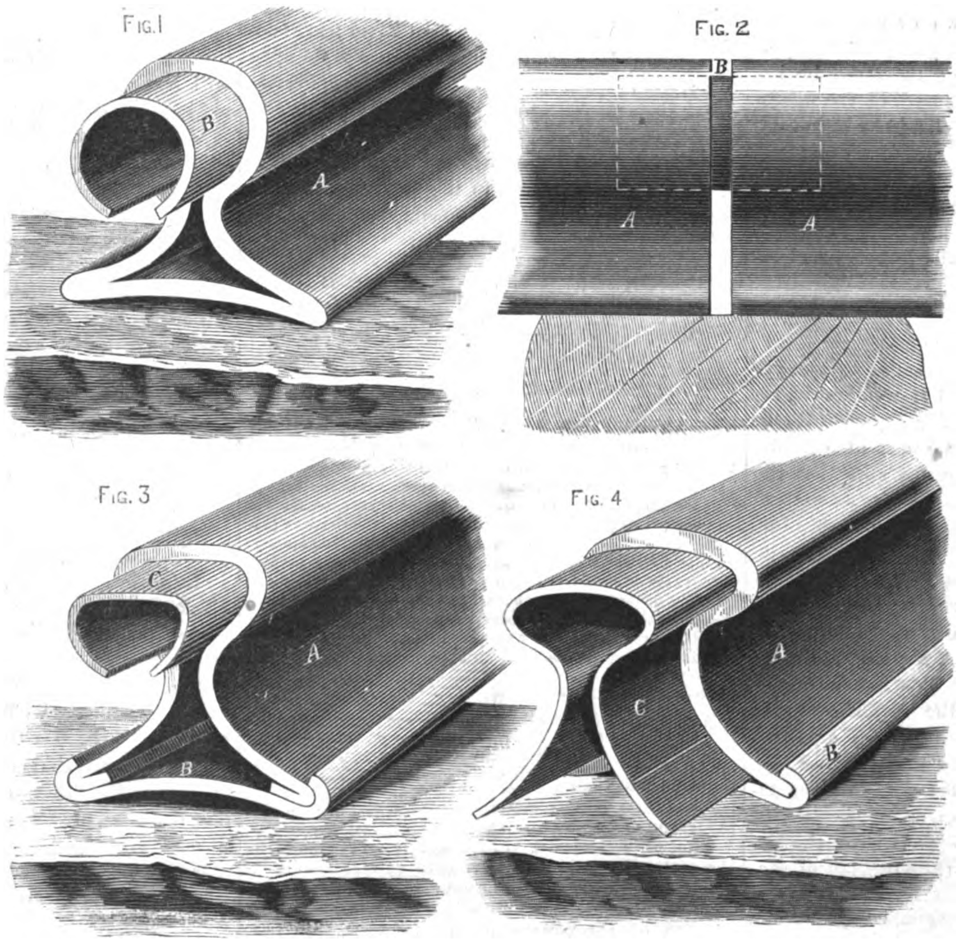
The fact that, by the approach of the sides of the rail at the neck the arch of the top is elongated vertically, is claimed to obviate the objection that elasticity in a rail makes an up-grade for the wheels to ascend.

The rails shown in Figs. 1 and 2 have the advantage of greater strength, while those with the lap-jointed base have the merit of greater cheapness.

There can be no doubt that very strong rails in proportion to their weight may be made in either way represented, provided the practical difficulties in their manufacture can be easily overcome. There would be, we judge, little tendency to granulation in such rails, and they would certainly make an easy passenger road.

To make the first form of rail shown, the inventor proposes to make the rail in the first instance a round tube, and then to shape it by subsequent rolling on the outside. It would seem that this should present no insurmountable difficulty. The lap-jointed rail and the elastic tube joints can be formed of rolled metal of the desired thickness. The tube-joints are not required to be more than sixteen inches in length.

The inventor, whose address is given above, de-



SANBORN'S IMPROVEMENTS IN RAILWAY RAILS.

sires to form a stock company to test and develop the practical worth of these improvements.

Ingenuity of Burglars.

THERE was a burglary in an Albany jewelry store on the night of the 2d instant, and one of several skillful devices to which the burglars resorted to prevent detection while operating upon the safe was the following:—On a work-bench on the south side of the shop a small looking-glass is placed, in front of which is a gas-burner. This small glass reflects the back of the safe on the large glass, and those who pass the store have a full view of it. The burglars, to conceal their operations, had prepared a curtain made of dark-green muslin, across which black muslin stripes were sewed to represent the bars on the back of the safe. This muslin was tacked on small wooden strips after the burglars entered the premises, and was hung over the large mirror. It was well calculated to deceive the patrolling watchman, and, but for his suspicions being aroused early in the evening by observing two or three strange characters in the vicinity, they might have operated successfully. On passing the store he noticed that the reflection of the back of the safe in the glass was darker than usual, and he shook the door three or four times. Receiving no response from the inside watchman, his suspicion that something was wrong was strengthened, and, breaking open the doors, he found that his interference had been too long delayed, for the robbers had retreated.

Carbolic Acid for preserving Hides.

THE difficulty hitherto experienced by tanners in keeping raw hides during hot weather is, according to the *Shoe and Leather Reporter*, likely to be wholly obviated by the use of carbolic acid. That well-conducted journal says that the use of carbolic acid at this time, so far as the experiments already made would seem to determine, is probably destined to be of great value to the trade.

It has been known for several years that the preservative properties of carbolic acid, when used on decaying substances of any kind, were of the most particular efficacy. This fact was very pointedly brought out by the experiments of the New York Board of Health, two or three years since, when it was found that nothing else would more effectually stop the decay of vegetable or animal substances than an application of carbolic acid. No matter to what state the decomposition had proceeded, an application of carbolic acid instantly checked its further progress, and rendered absolutely impossible any further decay.

Proceeding on the knowledge thus obtained, experiments were made at one of the large tanneries in Pennsylvania, as to the effect which carbolic acid might have on the color and grain of leather, when the hide was thus treated. It was found that the decomposition or decay of the hide (without making any difference as to what extent it had proceeded) were instantly stopped by the application of carbolic acid, and that the color and grain were in no way impaired. In fact, from the experiments thus far made, it would appear that both are somewhat improved and whitened by the use of the acid, but this matter has not yet been sufficiently tested to warrant the conclusion that either the grain or color will be in any way improved, if, indeed, it is at all affected by this new agent.

The Public Health.

THE Board of Health of the city of New York held an adjourned meeting on Saturday, the 11th inst., and ordered that a copy of the report of the Sanitary Committee, relative to the accumulations of manure at the dumping-grounds at East Forty-sixth and Forty-seventh Streets, and at West Thirty sixth, Thirty-seventh, and Thirty eighth Streets, and the orders issued by the Board relative to the removal of the manure, should be sent to the District Attorney, and the Board of Police should be requested to take the necessary measures to prevent further dumping. The Sanitary Committee recommended that no cushions should be used on the seats and backs in horse-cars; that the latter should be properly washed and cleaned daily; that no straw should be used on the floors of the cars; that no dirty or soiled clothing or bedding should be carried in the cars; and that the latter should be properly ventilated. Referred. The street-cleaning contractor was ordered to cease dumping on the Harlem flats, extending from Ninetieth to One Hundred and Sixth Street, and from Second Avenue to the East River; to disinfect thoroughly the material already dumped there, and to cover it with three feet of good earth, under the supervision of the City Sanitary Inspector. The Board of Police was requested to cause the arrest of all persons found dumping manure or street dirt anywhere in the city, except upon scows to be removed from the city limits.

DECISION OF THE COMMISSIONER OF PATENTS.

W. S. COTTRELL.—*Ex parte.*

[*Application for Letters-Patent for* ZINC-BOARD.—*Appeal from the Examiners-in-Chief.—Decided April 29, 1872.*]

NEW ARTICLES OF MANUFACTURE AS CREATED BY THE SUBSTITUTION OF MATERIAL.

Where by the substitution of tar-board or paste-board for wood, in combination with a zinc covering, for the protection of floors and other surfaces from the injurious effects of radiated heat, a convenient article of commerce was produced that supplied a recognized want in the community, while the wood and the zinc, on account of the greater thickness necessarily required in the wood to prevent it from warping, had never been combined except by the user, *Held*, that this was not a mere substitution of material, but was the creation of a new article of manufacture, for which a patent should be allowed.

DUNCAN, *Acting Commissioner*:—

Applicant's alleged invention consists in covering tar-board or paper-board with zinc, and thus forming a convenient article of manufacture to be put upon the market, and used to protect floors, carpets, and other surfaces about a stove from the injurious effects of the radiated heat.

The application is rejected upon reference to the well-known fact, adverted to in the specification, that wood with a zinc covering has been used for a similar purpose, and it is held in the majority opinion of the examiners-in-chief that this fact constitutes the use of the tar-board a mere substitution of material.

Applicant, on the other hand, insists that wood and zinc as thus used had never before been combined except by the consumer; that the thickness of wood required to prevent warping was necessarily so great that these two materials could not well be combined to form an article of manufacture to be put upon the market for sale in its completed form; that he is the first to make a "zinc-board," which as an attractive article of merchandise supplies a recognized want in the community, and that he has been enabled to do this by substituting for the wood previously used a substance which, while equally non-conducting, can be used in thin sheets without warping. He thus professes to have produced a new article of manufacture, and upon this theory he urges that he is entitled to a patent.

I think that this view of the case is the correct one. He has not simply suggested to the consumer a substitute for the wood previously used; he has created a new vendible article which answers a public want.

The decision of the examiners-in-chief is overruled.

Strike in the Lake Superior Copper Mines.

A SERIOUS strike has taken place in the above-named mines. Occurring as it does when copper bears an unusually high price, the effect will be to maintain and perhaps increase present rates.

On the 11th inst. the Sheriff of Houghton County, Mich., and the Judge of the Circuit Court telegraphed Gov. Baldwin that 1,500 men, employed in the Hecla, Calumet, and Schoolcraft Mines are on a strike, and committing outrages against the men who refuse to join them. The property of the companies is threatened with destruction, and the civil authorities are inadequate to preserve the peace. Troops are asked for immediately to quell these disturbances. Gov. Baldwin telegraphed to Gen. Sheridan, at Chicago, requesting that two companies of infantry be sent to the mines. Gen. Sheridan, in reply, states that all the available troops in his command have been sent to the plains. Application was then sent to Gen. Cook, at Detroit, and a company of infantry will leave in the morning for the mines. Information received at the *Free Press* office gives rise to the belief that the disorder will spread to the adjoining counties. Still later reports state that the disturbances are on the increase, and that more troops have been sent for.

Bridge Building.

LIEUT. GIBBON, who explored the interior mountainous wonders of Peru in 1851, gives a graphic description of a suspension bridge which he examined, constructed of bark twisted into ropes, that was almost equal to the wire suspension bridges of our time.

The cordage at one extremity was made fast to posts, which supported the roof of a house. He does not mention how the other extremity of the six parallel ropes was secured. The bridge was eighty yards long and six feet wide, spanning an awful gorge of 150 feet, above a foaming torrent of black water coursing over rocks below. Small sticks lashed to the ropes, side by side, made the floor.

A woman had charge of a rude windlass in the house, by which any one of the ropes was tightened when too slack.

It is admitted that suspension bridges originated in Peru in the times of the Incas. Those of wire, now common, are imitations of very humble contrivances for crossing streams and ravines between mountains by a demi-civilized race long before Europeans had placed a foot on the continent of America.

Steamboat Building in Pittsburg.

THE manufacturing interests of Pittsburg are so great, and influence so widespread, that, even though bridges for St. Louis may be built here, blast-furnace machinery for every State in the Union may be shipped from this point, and the various and diversified demands of metal manufacture, all over the country, supplied from this place, it may not be thought possible that Pittsburg can *supply the world with steamboats.* Yet this is possible. The first iron steamship built in this country was constructed in Pittsburg. This was the United States steamer *Michigan*, made here prior to 1845, shipped to Erie and put together, and is still one of the most substantial and serviceable vessels in the United States service.—*Pittsburg American Manufacturer.*

COMMUNICATIONS.

Brayton's Gas Engine.

To the Editor of the American Artisan:

Having waited several weeks expecting to see some contradiction of the statement made in the Artisan, on page 202, current volume, crediting John Bull with this invention, I herewith communicate a statement of its origin. It has been the favorite project of my life to develop a practical motive power that would answer the wants of the million, and I am happy to say that my efforts in this direction (which have continued for upwards of *twenty years*) have been crowned with complete success. At the close of the year 1855, experiments on gas engines had involved me to the extent of $7,000. At this stage I was compelled to ignore the explosive principle entirely as being utterly impracticable, and, at the same time, for the want of funds, lay the enterprise temporarily *on the shelf*. Subsequently, however, after some success in steam engineering, and having acquired a moderate fortune, I took up the favorite again, fully satisfied that I had "hit the nail on the head." In avoiding repeated ignition and explosive action, and substituting continuous combustion under high pressure and in harmony with the movement of the piston, I accomplished a most wonderful result in the saving of fuel, producing at the same time a simple machine that can be manipulated by a child. I have had a half horse-power machine running more than a year, a five horse-power some six months, and am now building a number of different sizes for the market, including a five horse-power engine to furnish power to blow the great organ at the forthcoming Peace Jubilee.

The operation of these engines has been witnessed by upwards of 60,000 people, many of whom are first-class mechanics; all have given me their congratulations and assurances of success.

Geo. B. Brayton.

Boston, Mass.

[We take great pleasure in publishing the above correction. The invention was properly credited on page 252, current volume, though without reference to the article referred to by our esteemed correspondent. The article on page 202 was gathered from an English source, in which the inventor was not named, and previous to the issue of his American patent.—Ed.]

British Channel Ferry Scheme.

To the Editor of the American Artisan:

My attention has just been drawn to the *Folkestone Express* (an English paper) of the 27th of April, 1872, wherein it gives an extract from your journal with reference to a correspondence I had through their pages relative to the British Channel ferry scheme.

Permit me, in the first instance, to thank you for your favorable review of my opinions on *that* all-engrossing subject. Be assured that in my professional judgment the Dover scheme does not possess the capabilities of those so fully displayed in the natural advantages professed by Folkestone for a new, extensive, and commodious harbor, either for international communication with its opposite neighbor, Boulogne. That harbor is well adapted by progressive improvement, for which there is ample space, for the enlarged channel ferry steamers. My plan for a new and enlarged harbor at Folkestone, upon which I have devoted much time (and a considerable correspondence), has been submitted to an eminent civil engineer, and has received his approval. The formation of a company with the required capital would soon realize the great desideratum of a port of refuge, either from the severe winter gales, the dangers of the Goodwin sands in foggy weather, or in event of war. I have no purpose to serve beyond that based upon patriotic grounds, tending to the benefit of the world's commercial navy, in which your great country takes so prominent a part as worthy descendants of old England.

I served on your coast during our unfortunate contest from 1812 to 1815, and since then, therefore, can fully and impartially estimate your splendid vessels. Nothing struck me so forcibly in my former recollections as your clipper Bourdeaux and Nantes runners. I was for some time stationed in the Chesapeake, and the Hampton pilot boats always claimed our admiration as fine sea-boats possessing great speed, and your specimens of latter years have not reduced our estimate of the United States naval architecture.

With reference to our civil engineer's favorite scheme of forming a harbor at Andresselles, situated between Boulogne and Calais:—From my professional knowledge of the coast, exceeding fifty years, I think that its capabilities for an efficient harbor are very doubtful, and I advise the promoters of the British Channel ferry scheme to turn their undivided attention to the formation of a new harbor at Folkestone that, with the improvement of the existing harbor, will, I hope, repay them, instead of wasting their money at Andresselles; not that I think their vessels will make more expeditious passage to or from Boulogne, or be better handled than the present boats. No doubt they would give increased comfort to passengers, which I freely admit is a great point gained.

R. A. Newman, *Captain R.N.*

A Heroic Female Sailor.

The *Abbie Clifford* is a brig owned by Clifford, Smith, and others, that left Pernambuco on the 27th of March, bound for New York, with a cargo of sugar. While at Pernambuco the yellow fever was at its height, and the crew were all taken sick, and the steward, T. T. Fay, of Stockton, Maine, died. The rest of the crew recovered, and, after getting a clean bill of health, they started homeward bound. Before they had been many days at sea the pestilence broke out afresh, and the first victim seized was a seaman of the name of Gustave Johnson, who eventually succumbed, and was buried on the 1st of April. The captain, a native of Stockton, Maine, of the name of Clifford, was then taken sick, and died on the 5th of April, and on the 9th of the same month, the first officer, Allen Smith, of Steeps Falls, Maine, also fell a victim to the same disease. It was at this time that the energy of woman was brought to light, for Mrs. Clifford, who had also been confined to her bed by yellow fever, on the death of her husband came out on deck and undertook to navigate the ship. Mrs. Clifford is a woman of small stature, dark hair, pleasing face lit up with a pair of sparkling eyes, radiant with intelligence and fire. When the time came that she was called upon to preserve the lives of those on board, she was found equal to the task and nobly did her duty. On the voyage home, Mrs. Clifford was assisted by Mr. Hitchborn, of Stockton, Maine, the second mate, an intelligent boy, who quickly learned from her the rudiments of navigation, and proved of invaluable assistance during the voyage home. They crossed the line on the 6th of April, and met with favorable weather up to Cape Hatteras, where they fell in with heavy weather. Here the seamanship of the second mate was brought into requisition, and, encouraged by the presence of his late captain's wife, who was always on deck, they passed through the storm with only some trifling damages.

Machinery on the Pacific Slope.

It having been stated that 2,000 mowers and reapers were delivered by railway in Sacramento this season, and that still there would likely be a famine of reaping machines, the *Pacific Rural Press* says the statement is greatly exaggerated; no such number of machines have been brought to California this season, and though the demand for such implements is greater than ever before, it is estimated that but about 700 or 800 new machines at most will be purchased.

The same paper states that the hardware stores are remarkably active, and new life seems manifesting itself in all parts of the country. As a matter of interest to its readers, as showing what is done in the line of purchase, it mentions the names of parties who have, within the last three or four weeks, bought of a single firm—Treadwell & Co.—heavy harvesting machines, viz.:—Hamlin & Patterson, Modesto; John Duke, Batavia; D. & D. Bain, Centerville, Alameda Co.; W. B. Brown, Collinsville; Webster & Co., Stockton; Wm. Carter, Vallejo; J. J. Strong, Rio Vista; Hellman & George, Anaheim; McKinstry & Co., Dixion; Beazell & Crowell, Washington Corners; S. McBaldwin, Los Angeles, have all purchased Hoadley's mounted engines and Russell's threshers, each thereby securing a complete set of steam threshing machinery. The Oregon and California Railroad Company have also purchased a heavy Hoadley portable engine and saw-mill; Bateman & Keller, of Yreka, have also purchased a Hoadley engine and mill; Messrs. Treadwell & Co. have besides just shipped W. B. Crane, of Portland, a 20 horse-power Hoadley mining engine and a 12 horse-power Hoadley hoisting engine, saw-mill, Sturtevant blower, Blake's steam pump, etc.; and Pletz & Sherman, Arizona, a Hoadley, with saw and shingle mills; W. W. Doherty, of Nevada, a Hoadley 15 horse-power engine; J. Dufries, on the Amoor River, Russia, a large Hoadley engine and a heavy order of other machinery, and a large lot of Russell threshers; Haines heading horse-power reapers, mowers, rakes, etc., to various parts of California, Nevada, and Oregon. Besides this, there has been a large trade in general hardware and mining goods.

Sheathing Iron Vessels with Wood.—Notwithstanding the acknowledged superiority of iron over wooden vessels for general service and durability, we have seen it stated that experience has shown the necessity for giving the former a protective sheathing of wood. At least this is the case on our great Northern lakes. The reason of this is, that, touching at so many ports where the entrance is through narrow, rock-bound channels, there is much danger of striking a jagged point or the loose boulders on the bottom. In either case there is danger of puncturing a hole through the unyielding iron plates, which cannot be easily stopped or repaired without going into dry-dock. Wooden vessels, however, frequently strike even harder without receiving serious injury, the wood of the hulls being sufficiently elastic to receive the shock without the breakage of the shell sufficient to admit water, or so little as not to injure the cargo, nor require dry-docking, the damage being repaired from the inside, or a liberal use of pitch or oakum.

THE TEMPERATURE OF THE SURFACE OF THE SUN.

BY CAPTAIN J. ERICSSON.

[From *Nature*.]

It will be recollected that Messrs. M. E. Vicaire and Sainte-Claire Deville read some papers before the Academy of Sciences at Paris last January, showing that the temperature of the solar surface does not exceed that produced by the combustion of organic substances, their reasoning being based on the law of radiant heat established by the investigations of Dulong and Petit. I have in the meantime instituted a series of experiments on a comparatively large scale, in order to test the correctness of the said law. Accordingly, the dynamic energy developed by the radiation of a mass of fused iron weighing 7,000 pounds, raised by "overheating" in the furnace to a temperature of 3,000° F., has been carefully measured.

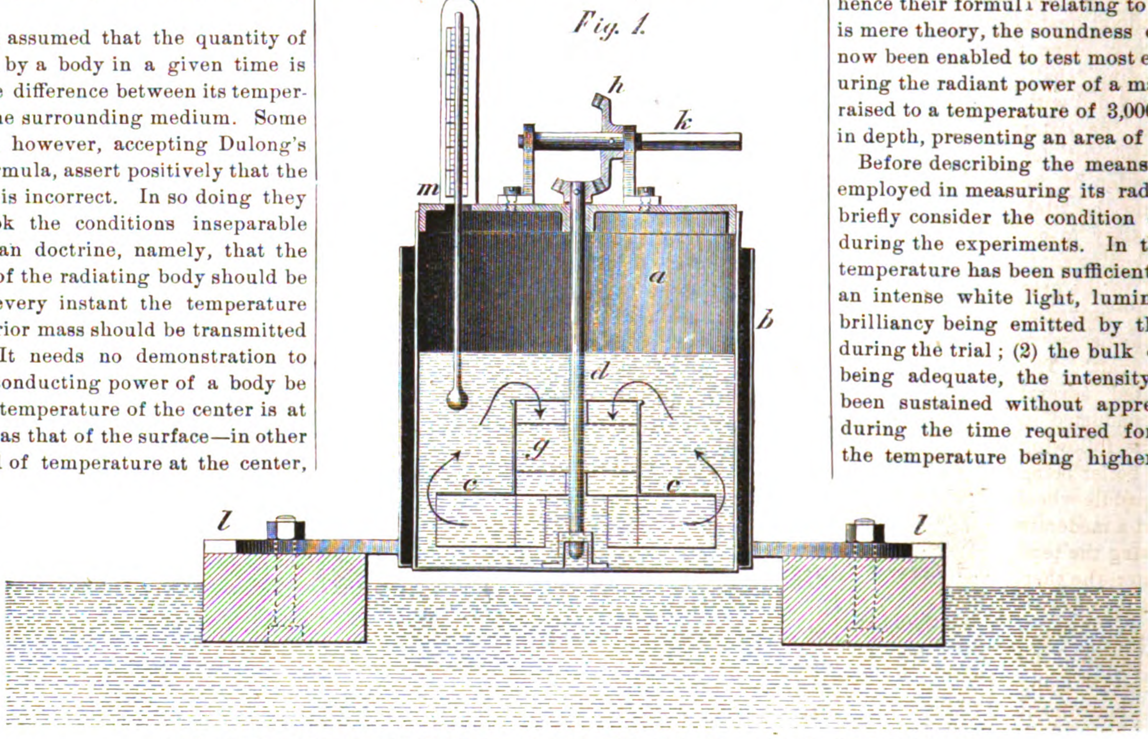
Sir Isaac Newton assumed that the quantity of heat lost or gained by a body in a given time is proportional to the difference between its temperature and that of the surrounding medium. Some eminent scientists, however, accepting Dulong's conclusions and formula, assert positively that the stated assumption is incorrect. In so doing they apparently overlook the conditions inseparable from the Newtonian doctrine, namely, that the conducting power of the radiating body should be perfect; that at every instant the temperature pervading the interior mass should be transmitted to the surface.* It needs no demonstration to prove that, if the conducting power of a body be so perfect that the temperature of the center is at all times the same as that of the surface—in other words, that the fall of temperature at the center, occasioned by radiation, is as rapid as the fall of temperature at the surface—the rate of cooling of such a body will be very different from that observed by Dulong and Petit. The investigation instituted by those experimentalists has in reality established only the degree of conductivity of the radiators employed, under certain conditions, but by no means their true radiant energy at given temperatures. M. E. Vicaire and Sainte-Claire Deville, therefore, commit a serious mistake in assuming that the *quantity* of heat transmitted by the radiation of incandescent bodies at high temperatures has been determined. It may be observed that the relation between the time of cooling and the *quantity* of heat transmitted by radiation which Dulong and Petit established, also misled Pouillet regarding the temperature of the solar surface, which he computed at 1,461° C., or at most 1,761° C. It will be well to bear in mind that Pouillet had himself ascertained with considerable accuracy the temperature produced by solar radiation on the surface of the earth; and also the retardation suffered during the passage of the rays through the terrestrial atmosphere. He was therefore able to demonstrate that the dynamic energy developed by solar heat amounts to nearly 300,000 thermal units per minute for each square foot of the surface of the sun. Considering the imperfect means employed by Pouillet, his "pyrheliometer," the exactness of his determination of solar energy is remarkable. The truth is, however, that the near approach to exactness was somewhat fortuitous, the eminent physicist having underrated the energy of radiant heat on the surface of the earth, while proportionately overestimating the retarding influence of the terrestrial atmosphere. The true dynamic energy developed by radiation at the surface of the sun, exclusive of the absorption of the solar atmosphere—no doubt exceedingly small—determined by the solar calorimeter mentioned in a previous article, is 312,500 thermal units per minute upon an area of one square foot. It will be proper to notice that this amount is not a mean result of a number of observations, but the greatest energy developed at any time during observations continued upwards of three years, namely, February 28, 1871. It will be proper to add that this result has been withheld from publication until it could be verified by a second observation indicating an equal energy. Fortunately the sky at noon, March 7, 1872, proved to be as clear as on the previous occasion referred to, the indicated energy differing only a few hundred units from that developed February 28, 1871.

Temperature being a true index of molecular and mechanical energy, conclusively established by the exact relation between the degree of heat and the expansive force of permanent gases under constant volume, it is surprising that Pouillet did not perceive that an intensity of 1,461° C, or 1,761° C. could not possibly develop on a single square foot of surface the enormous energy represented by 300,000 thermal units per minute. M. Vicaire, adopting, like Pouillet, Dulong's formula, states in the paper presented to the French Academy that "an increase of 600° is sufficient to increase the radiation a hundredfold"; and that Pouillet has verified Dulong's law to more than 1,000°. "Supposing," he observes, "that beyond this temperature the law ceases to be true, it cannot be absolutely remote from the truth for the temperature of from 1,400° to 1,500° which we deduce by adopting the law." Sainte-Claire Deville concludes his essay on solar temperature thus:—"In accordance with my first estimate, I believe that this temperature will not be found far removed from 2,500° to 2,800°, the numbers which result from the experiments of M. Bunsen, and those published long ago by M. Debray and myself." The French *savants* then agree that the temperature of the surface of the sun does not exceed the intensity produced by the combustion of organic substances, their grounds for this assumption being, as we have seen, Dulong's formula relating to the velocity of cooling at high temperatures. But Dulong and Petit did not carry their investigations practically beyond the temperature of boiling mercury; hence their formula relating to high temperatures is mere theory, the soundness of which we have now been enabled to test most effectually by measuring the radiant power of a mass of fused metal raised to a temperature of 3,000° Fahr., 30 inches in depth, presenting an area of 900 square inches.

Before describing the means which have been employed in measuring its radiant power, let us briefly consider the condition of the fused mass during the experiments. In the first place, the temperature has been sufficiently high to produce an intense white light, luminous rays of great brilliancy being emitted by the radiant surface during the trial; (2) the bulk of the fused mass being adequate, the intensity of radiation has been sustained without appreciable diminution during the time required for observation; (3) the temperature being higher than that which the French investigations assign to the surface of the sun, while the bulk, as stated, is sufficient to maintain the temperature of the fused mass, it may be reasonably asked why an area of one square foot of our experimental radiator should not emit as much heat in a given time as an equal area on the solar surface, if its temperature be that assumed by Pouillet? It may be positively asserted, moreover, that an increase of the dimensions of our radiator to any extent, laterally or vertically, could not augment the intensity or the dynamic energy developed by a given area. Again, Dulong's formula, as applied by scientists, shows that the emissive power of a *metallic* radiator raised to a temperature of 3,000°, reaches the enormous solar emission computed by Pouillet.

Let us now briefly examine the calorimeter constructed for ascertaining the mechanical energy developed by the radiation of the fused mass under consideration. Fig. 1 represents a vertical section, and Fig. 2 a perspective view. *a* is a cylindrical boiler, having a flat bottom, composed of thin sheet-iron 0·012 inch thick, coated with lamp-black. The cylindrical part of this boiler is surrounded by a concentric casing, *b*, the intervening space being filled with a fire-proof non-conducting substance. A horizontal wheel, *c*, *c*, provided with six radial paddles, is applied within the boiler, attached to a vertical axle, *d*. An open cylindrical trunk, *g*, is secured to the perforated disk which supports the paddles. The vertical

Fig. 1



CALORIMETER CONSTRUCTED BY CAPT. JOHN ERICSSON.

* The writer has just completed a set of experiments with a spherical radiator, 2·75 inches in diameter, composed of very thin hammered copper, charged with water kept in motion by a wheel applied within the sphere, revolving at a rate of 30 turns per minute, the centrifugal action of which brings the particles of the central portion of the fluid so rapidly in contact with the thin spherical shell, that the apparently absurd condition of perfect conductivity has been practically fulfilled. The result of carefully conducted experiments with this radiator, inclosed in an exhausted vessel kept at a constant temperature, has established that Newton's law relating to radiant heat, up to a differential temperature of 100° Fahr. (beyond which the investigation has not extended), is rigorously correct. The subject will be fully discussed in a future article.

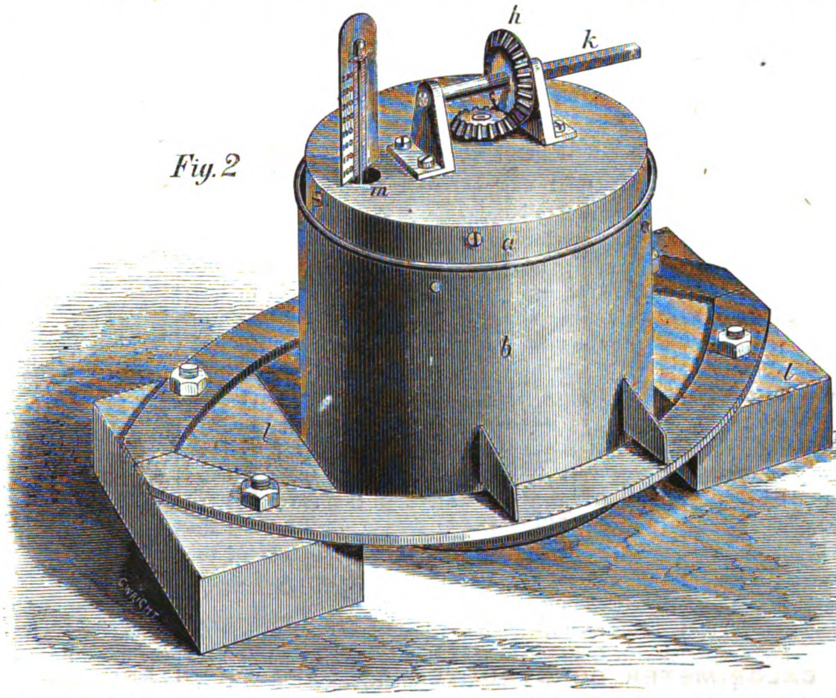
axle passes through the top of the boiler, a conical pinion being secured to its upper termination. By means of a vertical cog-wheel, *h*, attached to the horizontal axle, *k*, and geared into the conical pinion, rotary motion is communicated to the paddles. The contrifugal action of the latter will obviously cause a rapid and uniform circulation of the water contained in the boiler—indispensable to prevent the intense radiant heat from burning the bottom. The boiler and mechanism thus described are secured to a raft, *l*, *l*, composed of fire-bricks floating on the top of the fluid metal. By this means it has been found practicable to keep the bottom of the boiler at a given distance, very near the surface of the fused mass, while by moving the raft from point to point, during the observation, irregular heating resulting from the reduction of temperature of the surface of the metal, under the bottom of the calorimeter, has been prevented. The radiant heat being too intense to admit of the axle, *k*, being turned directly by hand, an intervening shaft, eight feet long, provided with a crank handle at the outer end, has been employed for keeping up the rotation of the paddle-wheel during the trial. It is scarcely necessary to observe that the intervening shaft should be coupled to the gear work by means of a "universal joint," to admit of the necessary movement of the raft. The experiment, repeated several times, has been conducted in accordance with the following explanation. The boiler being charged, the paddle-wheel should be turned at a moderate speed while observing the temperature of the water, the thermometer employed for this purpose being introduced through an opening, *m*, at the top of the boiler. The temperature being ascertained, the instrument should be quickly placed on the raft, and the time noted. As soon as vapor is observed to escape through the opening at *m*, the instrument must be instantly removed, the time again noted, and the temperature of the water within the boiler ascertained. It will be well to keep the paddle-wheel in motion until the last observation has been concluded.

The temperature of the fused metal having been as high during our experiments as that of the solar surface computed by Pouillet and his followers, while the thin substance composing the bottom of the calorimeter has been brought almost in contact with, and consequently received the entire energy transmitted by, the radiant surface, the reader will be anxious to learn what amount of dynamic energy has been communicated in a given time, on a given area. The desired information is contained in the following brief statement:—The necessary corrections being made for heat absorbed by the materials composing the paddle-wheel, etc., the instituted test shows that the temperature of a quantity of water weighing 10 pounds avoirdupois has been elevated 121° Fahr. in 164 seconds (2·73 minutes), the area exposed to the radiant heat being 63 square inches. Hence a dynamic energy $\frac{10 \times 121}{2{\cdot}73} \times \frac{144}{63} = 1{,}013$ thermal units per minute, has been developed by the radiation from one square foot of the surface of the fused metal maintained at 3,000° Fahr., against 312,500 units developed by the radiation of one square foot of the solar surface, the temperature of which, agreeably to the calculations of the French *savants*, is less than that of our experimental radiator.

Having thus ascertained practically the amount of dynamic energy developed by the radiation of a metallic body raised to the high temperature of 3,000°, we have only to show in a similar manner the amount of energy developed by a metallic radiator of a low temperature, to be enabled to demonstrate the correctness or fallacy of Dulong's formula. Numerous experiments have been made for this purpose with apparatus of different forms, the results having proved substantially alike. The device most readily described consists of a spherical vessel charged with water, suspended within an exhausted spherical inclosure kept at a constant temperature. Repeated trials show that, when the differential temperature is 65°, the inclosure being maintained at 60°, while the sphere is 125°, the dynamic energy transmitted to the inclosure by a sphere the convex area of which is one square foot, amounts to 5·22 thermal units per minute. The accuracy of this determination is confirmed by the fact that during the summer solstice at noon, when the sun's differential radiant intensity is 65°, the solar calorimeter indicates a dynamic energy of 5·12 units per minute on one square foot of surface.

Our practical investigations, then, show that a differential temperature of 3,000° develops by radiation a dynamic energy of 1,013 thermal units per minute upon an area of one square foot; and that a differential temperature of 65° develops 5·22 units per minute upon an equal area. The ratio of radiant energy at the first mentioned intensity will therefore amount to $\frac{1013}{3000} = 0{\cdot}337$ units for each degree of differential temperature; while for the low intensity it will be $\frac{5{\cdot}22}{65} = 0{\cdot}080$ unit for each degree of differential temperature. Consequently the ratio of the radiating energy will be $\frac{0{\cdot}337}{0{\cdot}080} = 4{\cdot}21$ times greater at 3,000° than at 65°

Fig. 2



CALORIMETER CONSTRUCTED BY CAPT. JOHN ERICSSON.

Now, M. Vicaire, on the authority of Dulong states that the ratio will be a hundredfold greater for an increase of only 600°. According to Newton's theory, based on dynamic laws, the proportion between the differential temperature and the radiant energy of bodies is constant; while Dulong and Petit, basing their conclusions upon an erroneous estimate of the time of cooling, assert that the ratio of energy increases several thousand times when the temperature is increased from 65° to 3,000°. Newton, then, as our experiments prove, is incomparably nearer the truth than the French experimenters; and possibly future research will prove that his law, when properly applied, will be found absolutely correct. It should be mentioned that the result of our experiments with the fused metal, compared with the result of the experiments with solid metals at various temperatures, shows that the emissive power of cast-iron is relatively greater in a state of fusion than when solid or merely incandescent. This observed increase of emissive power, now being thoroughly investigated, will no doubt account for the deviation from the Newtonian law indicated by the preceding comparison, which, let us recollect, is based upon the difference of radiant energy of fused metal at 3,000°, and solid metal at 65°. Considering this extreme range of temperature, and the totally different conditions of the radiators, the observed discrepancy is not too great to admit of satisfactory explanation.

The fallacy of Dulong's formula relating to high temperatures having been conclusively shown, it will not be necessary to examine the calculations of Messrs. M. E. Vicaire and Sainte-Claire Deville, presented to the Academy of Sciences at Paris. Besides, the question of solar temperature cannot be properly investigated without considering the leading points connected with the propagation of radiant heat through space—a subject of too wide a range to be discussed in this article. It should, however, be mentioned that the result of the measurement of solar intensity March 7, 1872, before referred to, proves the correctness of our previous demonstrations, showing that the temperature of the surface of the sun is at least 4,036,000° Fahr.

The Inventor of the Steamboat.

ROBERT FULTON OVERESTIMATED.

Mr. William Stone, in his forthcoming history of New York, asserts that to John Fitch and not to Robert Fulton belongs the credit of having invented the steamboat. He says:—

"Probably no person has received so much praise, and deserved it so little, as Robert Fulton. A man of no practical ingenuity—of no power of conceiving, much less of executing, an original mechanical idea—his friend Colden has succeeded in persuading the public that to him alone is due the successful navigation of our rivers by steam. The facts, however, as I gathered them from the late Bishop Potter, of Pennsylvania, who in turn received them from Chancellor Livingston him-

self, are as follows:—Thirteen years before Fitch experimented with his steamboat upon the Collect in New York, he had, as is well known, run a little steamer on the Delaware, between Philadelphia and Bordentown, with great success. During that period he had experimented with various kinds of propelling power—the screw, the side-wheel, and sweeps or long oars. The most primitive thing about his vessel was the boiler, which consisted simply of two potash kettles riveted together. Mr. Livingston, who was greatly interested in the success of Fitch's experiments, seized the opportunity, when Minister to France, to visit the workshops of Watt & Bolton, in England, where, for the first time, he saw a properly constructed steam-boiler. But how was he to introduce it into the United States, unless (which was then impossible) he went there himself?

"At this crisis he thought of Robert Fulton, who, originally an artist in Philadelphia, was then exhibiting a panorama in Paris. His panorama, however, failing to pay, was attached, and he himself arrested for debt and thrown into prison. Livingston also, at this time, had in his possession the plans, models, and drawings of what was afterwards the successful steamboat, which he had obtained from the American Consul, then residing at Havre, who, in turn, had purchased them of Fitch, when the latter, completely discouraged and a stranger in France, utterly destitute, had given up in despair. Livingston falling into the error, so common to many, of believing that because an artist can draw cleverly he must necessarily succeed equally well in mechanical conception and execution, paid off Fulton's debts, and sent him over to New York with one of James Watt's boilers. Fulton, however, thoroughly incompetent and untrustworthy, failed to rise to the occasion; and when Livingston returned, a year after, he found his pet project precisely where he had left it several years before. He, therefore, at once took hold of it himself, and by his energy and perseverance finally brought his idea to a successful issue—Fulton, whom he could not entirely shake off, acting as a kind of general superintendent.

"These facts, moreover, are confirmed not only by the late President William A. Duer, in his *New Yorker* (Letter 7th), but by Mr. Ransom Cook, now (1871) living at Saratoga Springs, N. Y. Mr. Cook informs me that in the summer of 1837 he was in the city of New York, engaged upon his electro-magnetic machinery. Among his workmen were two who had been employed by Livingston and Fulton while those gentlemen were perfecting their steamboat. They surprised him greatly by stating that Fulton was a capital draughtsman, and that was all. They added that he was so deficient in a knowledge of the laws of mechanics as to furnish daily mirth for the workmen, and that it was a long time before Livingston could convince him that the 'starting-bar' of an engine should be made larger at the fulcrum end than at the handle!".

IRON AND STEEL DUST.—A Boston mechanic recommends the placing of electro-magnets in shops where iron and steel dust prevails, to take up the particles and prevent them from pervading the atmosphere and injuring the health, which would undoubtedly prove effectual.

A MACHINE has been invented in Chicago for making type by a cold pressure process out of copper. It is said that copper type made by this process lasts ten times as long as cast type.

Working Bessemer Steel from the First Heat.

IN the manufacture of steel by the Bessemer process, it is usual to allow the ingots, after casting, to become cold, and afterward to reheat them in furnaces before hammering or rolling. A change in this part of the process has been proposed by John Birch, of Newton Heath, England, who, by retaining the heat in the ingot, avoids the necessity for reheating. Mr. Birch thus describes his invention:—"I am aware that attempts have been made to work the ingot direct from the converting pit; but these have failed, in consequence of the outside of the ingot being too cold while the inside has been too hot. I propose to remedy these defects by inclosing the ingot immediately it is taken from the mold in a suitable chamber made of fire-resisting and non-conducting substances, such as fire-brick, powdered charcoal, graphite, asbestos, lava, pumice-stone, small coke, or any other suitable substances, to prevent the heat from radiating from the external part of the ingot, and thus preserving its temperature until the interior is properly set, and the time arrives when the further manipulation or treatment can be more successfully carried out."

Our National Park.

THE Great National Park in the Yellowstone Reservation in Montana and Wyoming Territories is thus described in the *Scientific Press*. The land reserved lies near the headwaters of the Yellowstone River, commencing at the junction of Gardiner's River and the Yellowstone, and running east to the meridian, passing ten miles to the eastward of the most easterly point of Yellowstone Lake; thence south along that meridian to the parallel of latitude passing ten miles south of the most southern point of Yellowstone Lake; thence west along that parallel to the meridian, passing fifteen miles west of the most western point of Madison Lake; thence north along the meridian to the latitude of the junction of the Yellowstone and Gardiner's Rivers; and thence east to the place of beginning.

This area of land has been reserved and withdrawn from settlement or sale, and set apart as a public park or pleasure ground, for the benefit of the people of the United States. It is to be under the control of the Secretary of the Interior, who is to make such rules and regulations as he may think proper for its care and management. All timbers, mineral deposits, natural curiosities, or wonders are to be preserved in their natural condition, and remain undisturbed. The Secretary may, if he sees fit, grant leases for building purposes, for terms not to exceed ten years, of small parcels of land, at such places as may require houses for the accommodation of visitors. All the revenue from this source is to be expended in building roads, bridle-paths, etc., in the park. The Secretary is to provide against wanton destruction of game and fish in the reservation, and against their capture for the purpose of profit.

The land is, as a general thing, not susceptible of cultivation, and the entire area within the limits of the reservation is over 6,000 feet above sea level. The Yellowstone Lake, which occupies an area 15 by 22 miles, or 330 square miles, is 7,427 feet. The range of mountains that hem the valleys in rise to a height of from 10,000 to 12,000 feet, and are covered with snow all the year round. These mountains are all of volcanic origin, and it is not probable that any mines will ever be discovered there. During the months of June, July, and August the climate is most invigorating, with scarcely any rain or storms of any kind. There is frost every month of the year. This whole region was, in comparatively recent time, the scene of the most wonderful volcanic activity of any portion of our country. We have given, at different times, detailed descriptions of some of the wonders of this region, which will in a few years be a place of resort for all classes of people from all parts of the world.

The project of establishing a Grand National Park in such a locality is worthy of the age and the nation which has originated the idea. It will become, in future ages, a place for the world's resort, where the grandeurs of nature and all her wonderful displays of power and energy, as put forth in the tempest, the earthquake, and the volcano may be seen, studied, and admired in the great laboratory within which the fires have been, as it were, but just extinguished.

New Case-hardening Process.

A RESIDENT of Montreal has recently patented in the United States a new process of carbonizing wrought-iron articles. The inventor prepares a bath of molten cast-iron, having previously eliminated any phosphorus and sulphur it may contain. Spiegeleisen is especially recommended for the purpose; but good malleable iron, melted in a cupola with charcoal, anthracite or bituminous coal, or coke, will serve the purpose. Crucibles for melting small quantities, or reverberatory furnaces for large masses, may be employed. The cast-iron readily yields its carbon to the immersed articles, and this element would rapidly become exhausted if no means were taken to continue a supply. To obviate this, the crucibles and furnaces are lined with a coating of charcoal powder or of plumbago with which nitrogenous matter has been incorporated. Leather or horn shavings will do for this purpose.

California Silk Growing—An Important Offer.

THE *Bulletin* states that Samuel Brannan has now upon his farm, at Calistoga, 8,500 mulberry trees, the leaves of which are the food of one of the most interesting and curious creatures in the world, the silk-worm. These trees are some five years old, and their leaves can be used this year for feeding the worms. Mr. Brannan has invested a very large sum of money in raising the trees He does not profess to know anything practically about the business of silk-worm raising or silk culture. His object in planting the trees was to found an important industry in a locality where he is a large land-owner. He also had the creditable object in view of developing and connecting his name with the production of native silk. Silk-raising is one of the most extensive, scientific, and profitable branches of the world's industry.

Mr. Brannan has just made the extremely liberal offer of allowing twenty or thirty persons who are skilled in silk-worm culture to have the free use of all his mulberry leaves, and he also offers to erect whatever class of buildings they say is requisite for the proper conduct of the business. We presume there are plenty of Frenchmen, Germans, and Italians here who will embrace this offer, which certainly appears to be framed in a spirit of enlarged liberality and enlightened progress.

Visitors at Calistoga from the silk-raising districts of France and Italy have informed Mr. Beannan that the mulberry trees on his farm would, in a few years more, be sufficient to support the population of five ordinary French villages.

A whole family in France frequently derives its living from one mulberry tree. There is a tree on the banks of the Rhone which is known to be 300 years old. Frost does not injure the mulberry; blight passes it; destructive insects and animals do not touch it; parasites do not attack it. Nature made the curious tree for the silk-worm, and the still more curious (nay, mysterious) worm to devour the leaves of the tree; leaves which indirectly are for the dressing of the females of all civilized nations. The mulberry tree attains a growth as elevated and spreading as our largest native oaks.

The journal quoted remarks that we are, perhaps, occasionally inclined to exaggerate the future possibilities of growth and development of some of our native industries. This it is hardly possible to do, however, in the case of silks. We may have failures and delays, doubts and almost despair, in the path leading to its perfect and permanent establishment; but the mulberry tree can be grown here—*that* we know—and our climate has, of all others, the requisite heat, and, above all, the requisite dryness—*that*, too, we know—and with these two advantages, success in and the general spread of silk culture in California, are only questions of time, whether of five, ten, or twenty years, rests entirely with ourselves.

The New York "Tribune" on the New Trans-continental Railway.

"TWENTY years ago, whoever presumed to advocate the construction of a railroad from our Atlantic to our Pacific States was properly regarded as a demagogue fishing for votes in very shallow water or as a moon-struck visionary; to-day, one completed line across the continent has for nearly three years been making regular trips, and is now bringing us cargo after cargo of teas and silks from China and Japan; another has already crossed the Mississippi, will this year reach the great bend of the upper Missouri, and be finished within five years; while a third (the Southern) will be well begun this year and completed within seven years. These ventures have incited British emulation, and a fourth trans-continental railway, running north of the great lakes and connecting the Canadas with the British Columbia, will soon be under contract. We predict that the mineral wealth disclosed or developed by this road will largely overpay its cost.

"For years the construction of still another trans-continental line has been agitated. It is known as the 35th parallel, because its general course will be along that parallel of north latitude, and thus nearly equi-distant from the Union Central on the north and the Southern or Texas Pacific on the south. We presume Little Rock, the capital of Arkansas, to be the point at which it will gather into itself a radius of Eastern or Atlantic roads, thence passing up the valley of the Arkansas to the mouth of the Canadian, thence up the Canadian to its northward bend in New Mexico, leaving Santa Fé a little to the north and crossing the Rio Grande near Albuquerque, leaving New Mexico not far from the head of the Colorado Chiquito, and passing north of Prescott, crossing the Colorado near Fort Mohave, and reaching the Pacific near Santa Barbara or San Luis Obispo, thence bearing northwest to San Francisco. This road will at no point be obstructed by snows in the wildest winter, will traverse for half its length a fertile country already inviting settlement, while the other half is known to be rich in the precious and other metals. Were it this day completed and running, it would add many millions per annum to the wealth of our country, while its course would be marked by new farms, new dwellings, mills, factories, and furnaces. Ten years hence, the route of this road will have a population of millions of energetic, thrifty, prosperous American citizens."

A New Tempering Furnace.

EVERY new industry, of course, calls for new methods and new instrumentalities, which keep inventors ever on the alert to supply new needs in the way of improved tools and methods. The farm implement interest has opened a field of peculiar fertility to the thought of the inventor.

A correspondent of the *Railway Times* writes that among the recent inventions now in the Patent Office is a furnace for hardening and tempering mowing machine knives by the quantity. The immense number of these knives used of course requires some method of tempering them surely and rapidly. This furnace combines a hardening furnace and tempering oven in one, arranged in such a manner that the heat from the hardening fire supplies all the necessary heat to the tempering oven. After the articles are hardened, they are placed, to the amount of several gross if need be, in swing cages, which are suspended to the arms of a slowly revolving wheel in the tempering oven, so that each cage passes alternately through the highest and lowest portion of the oven; the heat from the furnace enters at the bottom and passes off at the top of the oven; hence each cage receives exactly the same amount of heat. A thermometer is so placed that its bulb is within the oven, while its divisions are outside, and may be observed by the attendant, who by means of dampers may keep the temperature of the oven at the desired degree, however hot the furnace may be, so that whatever length of time the articles may remain in the oven they can never fall lower than the desired temper.

Grace Greenwood's Description of an Earthquake.

IF any one wants to experience an earthquake from a safe place, he should read the graphic description which Grace Greenwood gives, in the New York *Times*, of the late disastrous earthquake in California. She says:—

"I dreamed I was at sea, and the ship suddenly struck upon a rock, and shuddered and shivered and creaked fearfully. I woke to feel the rocking, straining motion of the ship, and the roar of the wind and waves. I had actually some moments of vague distress and terror before I realized where I was, and what was the strange tumult and shock, and knew that the fearful power that was shaking the great solid house, and rattling the windows and swinging the chandeliers about me, was neither of the air or sea—that the dull, appalling roar was neither the sound of a 'mighty, rushing wind' nor the 'voice of many waters'—though it was like to them both, nor could it be taken for thunder, or the rumbling of cars, or the tumult of battle. It was something peculiar, strange, terribly unfamiliar, yet impossible to be mistaken, a nameless horror of sound, muffled, portentous, and all-pervading. It did not seem to me to belong to the earthquake. It seemed in the air, not under the ground, it was not the growl of imprisoned thunder, but the ominous, defiant roar of some unknown element of death and destruction, 'flying all abroad.' It was more terrible to me than the rocking and trembling all about me. . . . There was something so mysterious, so stupendous, so almost grand in that shudder of the solid globe, that nightmare of the sleeping earth, moaning and tossing under the still bright heavens. We were hushed and humbled; with a sense of the most utter helplessness we could but try to look behind nature to nature's God, silently to appeal from her pitilessness to his pity; from her restlessness to his rest."

Acoustic Effect of Magnetization.

THE following is from a lecture by Prof. Tyndall:—"The effect I wish to make manifest was discovered by Mr. Joule, and was subsequently examined by MM. De la Rive, Wertheim, Marian, Matteucci, and Wartmann. It is this:—At the moment when the current passes through the coil surrounding the electro-magnet, a clink is heard emanating from the body of the iron, and at the moment the current ceases a clink is also heard. In fact, the acts of magnetization and demagnetization so stir the particles of the magnetized body that they, in their turn, can stir the air and send sonorous impulses to our auditory nerves. The sounds occur at the moment of magnetization, and at the moment when magnetization ceases; hence, if means be devised of making and breaking, in quick succession, the circuit through which the current flows, we shall obtain an equally quick succession of sounds. I do this by means of a contact breaker which belongs to a Ruhmkorf's induction coil. A thin bar of iron stretches from one of the bridges of this monochord to the other. This bar is placed in a glass tube, which is surrounded by copper wire. The contact breaker is placed in a distant room, so that you cannot hear its noise. The current is now active, and every individual in this large assembly hears something between a dry crackle and a musical sound issuing from the bar in consequence of its successive magnetization and demagnetization."

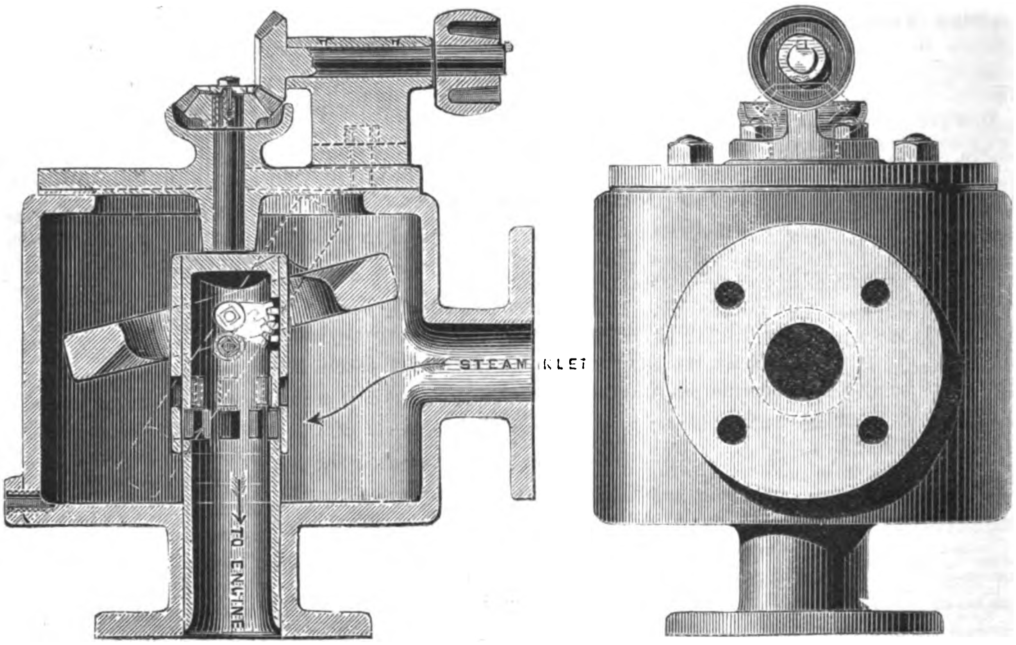
Kentucky Curiosity.

CARTER COUNTY, Ky., seems to be a wonderful place for curiosities. There is a natural bridge there 219 feet in the span, 196 feet high, and 12 feet wide, arched below and level on the top; under it is a cascade with a fall of 75 feet, and two miles distant another with a fall of 200 feet. Then there are two wonderful streams, one called the Big Sinkey and the other the Little Sinkey. These are "good-sized streams," which run about two miles and then suddenly disappear. But we have not done with Carter County yet. It has a "natural artesian well" which once played a jet of four feet high; now it is a foot high, because sight-seers, to find out the depth, have thrown so much rubbish into the well. Finally comes the most astonishing wonder—a rattlesnake seen near the spot, which "reached across the bridge and had a body as big as an ordinary churn." It must be absolutely fatal to be bitten by such a badly proportioned snake.

LIGHT IRON BRIDGES.—A great want, says the *Railway Times*, is a light but substantial iron bridge, built in short sections, and so constructed as to be joined for a shorter or longer span, with iron spile abutments and iron cross-heads. A single-track bridge of this description, of from twenty to thirty feet span, could be furnished by a company especially equipped for their construction, at a price which would not greatly exceed the cost of the stone and wood bridge, and be sufficiently substantial to outlast a dozen of them, which would make them from six hundred to a thousand per cent. more economical.

Brotherhood's Gyroscopic Governor.

We illustrate herewith a very neat form of steam-engine governor, designed and lately patented by Mr. P. Brotherhood, of the firm of Brotherhood & Hardingham, London. As will be seen from the engravings, the governor is contained in a casing through which the steam passes on its way from the boiler to the engine, it being advisable, to insure prompt action, that this casing should be fixed on the valve-chest, so that as little steam as possible may intervene between the throttle-valve and the cylinder. Motion is communicated to the governor by a pair of bevel-wheels, as shown, one of the wheels being fixed on a short spindle, which carries a belt-pulley, and the other being keyed upon a brass spindle, which passes down through the top of the casing in which the governor is contained. The spindle is made in one piece with a tubular portion, which is continued downwards so as to enter about 3½ inches into the pipe or nozzle through which the steam leaves the casing, this nozzle being bored out to receive it. The upper closed end of this tubular brass casting is faced so as to fit against the lower end of the tube or socket through which the spindle enters the casing, and, being forced into close contact with the end of this tube by the pressure of the steam, a steam-tight joint is obtained without employing a stuffing-box.



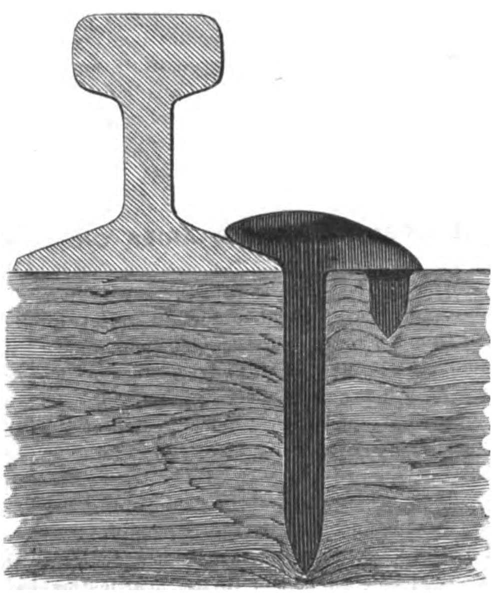
BROTHERHOOD'S GYROSCOPIC GOVERNOR.

On the tubular casting is fitted, so as to slide freely, a brass sleeve, having formed in it a number of ports or openings, which, when the sleeve is in a certain position, correspond to similar ports in the casting on which the sleeves slide. When the two sets of ports thus correspond, the steam has a clear way through them from the boiler to the engine, but in proportion as the sliding sleeve is raised above the position just mentioned, so the ports are more or less closed, until, when the parts assume the positions in which they are shown by the full lines in our engravings, the steam-way is shut altogether.

We have now to explain the manner in which the lifting of the sleeve is accomplished. Upon a spindle, which passes transversely through the sleeve and tubular casting, there is mounted a heavy "flier" of the form shown in the figures. The cross spindle which carries the flier, fits the holes in the sleeve through which it passes, so that, as the sleeve rises and falls, the spindle rises and falls with it, this vertical motion being permitted by the holes in the tubular casting, through which the spindle passes, being made of an oblong form, as shown in the vertical section. At the center of the length of the spindle is fixed a quadrant, which gears into a rack cut in the side of the tubular casting, as shown. The action of this arrangement will be readily understood. Let us suppose the parts to be in the position shown by the dotted lines—the steam way being then full open —and let the governor then be put in motion. The effect of this rotation will of course be to tend to make the flier assume an approximately horizontal position; but in assuming this position, it imparts a partial rotation to the cross spindle on which it is mounted, and consequently to the toothed quadrant, the effect being that the quadrant, as it were, climbs up the rack, lifting the spindle on which it is fixed, and, consequently, the flier and the sliding sleeve. This lifting motion, of course, closes the steam ports to a greater or less degree. It will be seen that by this arrangement the constant weight of the flier and sliding sleeve is opposed to the centrifugal force. The governor is, as we have said, a very simple one, and is said to be very sensitive in its action.

DWYER'S PATENT RAILWAY SPIKE.

The accompanying engraving illustrates an improved railway spike, patented Oct. 5, 1869, by Mr.



P. J. Dwyer, of Elizabethport, N. J. The inventor states that he has found that in practical use spikes are first loosened in their positions in the tie by the lateral springing of the ties near the top caused by the outward pressure on the rails, which gradually widens the space occupied by the spikes, until the frictional hold thereon of the wood is so lessened that the spikes soon yield to the upward springing action of the rails; spikes being also broken frequently by the lateral springing caused by the rails after the holes have been enlarged to some extent. To overcome these difficulties, the usual elongated head of the spike is extended back on the side opposite that which laps upon the flanch of the rail, in such manner as to bear fairly upon the face of the tie, and thereby resist the spring of the shank at the point where it is ordinarily worked loose. To further resist the lateral action of the rail, there is provided on the extension just described a downwardly projecting stud or auxiliary spike, which, when the spike proper is driven down into the tie, will enter the latter, and thereby resist more effectually the drawing action exerted upon the spike by the rails, as just previously herein indicated. Upon the top of the head are provided overhanging ledges for application of the claw-bar for drawing when required. It is claimed also for this spike that it is peculiarly adapted to resist the great outward pressure upon the rails where curves occur in the railway line, and also that the liability of the common spikes to fracture at the junction of the head and shank, caused by the forcible striking of the head upon the flange when too hard driven to its place, is effectually prevented. Mr. Dwyer is desirous of disposing of state rights for this invention, and may be addressed as above.

Increase of Small-pox in New York.

Small-pox is increasing steadily, and other contagious diseases as well. The following is a statement of the contagious diseases for the two weeks ending May 11:—

Week ending	Fevers: Typhus.	Typhoid.	Scarlet.	Measles.	Diphtheria.	Small-pox.
May 4........	1	12	106	56	18	93
May 11.......	4	4	118	50	30	115

Tannate of Soda for removing Scale in Boilers.

The *Oneida Circular* says:—"G. W. H., who has the oversight of our boiler-room, has recently been making a trial of 'tannate of soda' for removing the scale which accumulates on the inside of the boiler-pipes in consequence of using hard water. After a two weeks' trial in our Root boiler, nearly half a bushel of broken-down scale and soft mud was taken out. The action of the tannate is to first loosen the scale. At present about two pounds a week are used; but after the scale is once thoroughly removed, the occasional application of a much smaller quantity will keep the boilers free from any further deposit of it. G. W. H. thinks, if it continues to work as well as it now promises, it will make a saving of thousands of dollars in a few years in fuel alone, besides a saving in the wear and tear of boilers, and relief from the risk of explosions. Tannate of soda has been in use for this purpose about three years, and is steadily gaining the confidence of the public."

AMERICAN ARTISAN

BROWN & ALLEN, Publishers,

ISSUED WEEKLY AT

No. 189 Broadway, New York.

S. T. BROWN. L. ALLEN.

AGENTS.

AMERICAN NEWS COMPANY, New York City; NEW YORK NEWS COMPANY, New York City; NEW ENGLAND NEWS COMPANY, Boston; A. WINCH & Co., Philadelphia; H. TAYLOR & Co., Baltimore.

WEDNESDAY, MAY 22, 1872

CONTENTS OF THIS NUMBER.

[Illustrations are indicated by an asterisk.]

EXTRAORDINARY INDUCEMENTS.

THE publishers of the AMERICAN ARTISAN, to secure the aid of their subscribers in extending the circulation of this useful journal, offer the following EXTRAORDINARY INDUCEMENTS:

To every subscriber whose name appears in our subscription books, and who sends us a new name with our regular subscription price inclosed, and twelve cents in postage stamps, we will mail free, and post-paid, one copy of Brown's FIVE HUNDRED AND SEVEN MECHANICAL MOVEMENTS, elegantly bound in cloth, and illustrated with 507 engravings. The retail price of this book, post-paid, is $1 12. A more liberal premium was never offered. This work has received the highest encomiums from the press, and, during the short time since its first appearance, has reached its ninth edition. A father wishing to place a work in the hands of his son that shall thoroughly initiate him into the mysteries of the elements of machinery, can find no work that will take the place of this able treatise. Each movement is illustrated by a clear engraving, accompanied with descriptive text, and is by far the most complete collection of mechanical movements ever published. To the inventor it is an invaluable aid, and will save weeks of study and much needless expense in the search for what has already been discovered. We will also send, post-paid, to any one who remits us $4 12, two copies of the AMERICAN ARTISAN and one copy (post-paid) of the above-named work. To any one who sends us two subscriptions, with $4, we will mail a copy of the AMERICAN ARTISAN free for one year from date of receipt of remittance.

For more complete description of Brown's FIVE HUNDRED AND SEVEN MECHANICAL MOVEMENTS and opinions of the press, see our advertising columns.

THE VALUE OF A CAVEAT.

WHENEVER an inventor is engaged in experimenting with an invention with a view to perfecting the same, it is desirable that the claim to priority should be protected by a caveat. This affords security against the issue of a patent to another party without notice for one year. It costs but little to file a caveat, and the benefit of this measure often proves to be of great value in determining the rights of the original invention.

Brown & Allen attend to the preparation of caveats, and may be consulted with regard to the matter at their office or by mail.

CANADIAN PATENT LAW AMENDMENT.

THE new patent bill now before the Canadian Parliament, of which we have a copy, provides for the granting of patents to others as well as to residents of Canada, for inventions which have been patented in other countries for not more than one year prior to the date of the application in Canada; but denies a patent for an invention which has been described in a book or other printed publication before such date. It will be interesting to American patentees to know whether, under this bill, if it become law, they will be able to obtain valid patents in Canada after the issue of their patents at home; or whether the official printed publication of their specifications by the United States Patent Office will constitute such a publication as is intended by the Canadian bill to deprive the inventor of his right to obtain a patent on an application filed in Canada within a year after the issue of his American patent.

THE OPENING OF LIBRARIES ON SUNDAYS.

THE opening of the Mercantile Library on Sunday, the 12th inst., has called forth a variety of opinion from the press. The secular papers almost unanimously approve of it, and we must say we can see no valid reason offered by the religious papers for their opposition. Indeed, some of the latter do not oppose, while a few go so far as to sanction it.

The attendance on the first Sunday opening was small. No instance of disorderly conduct was noted by the various reporters who attended during the day, and all concur in the heartiest expression of the opinion that nothing but good can result from the new departure.

The class of readers are described as being mostly middle-aged and young men. Only one lady is said to have entered the library, though, perhaps, the rigid scrutiny ladies are subjected to at the door will have the effect to deter many from attempting to avail themselves of the privilege. We trust this feature of the programme will be carried out with as much delicacy as possible, as it must be highly offensive to any female to be questioned as though she were a *demirep*.

The small number of young people is not as encouraging to the projectors of the scheme as could be wished. Still it is hoped that, with a more general understanding of the advantages offered, young men will form a larger portion of the attendants. It is, however, too soon to judge of the probable results of the movement, although it is quite certain that, if less good will be accomplished than was hoped, no evil can possibly result.

THE PROTECTION OF AMERICAN INDUSTRY.

THE word "protection" has acquired a special meaning in relation to the policy of the General Government as regards national industrial interests. It is understood, when used in this connection, to signify the fostering of home industries, by the removal of destructive foreign competition, through the imposition of a sufficiently high tariff on such imported goods as can be produced by manufactories already established, or the establishment of which it is deemed desirable to encourage in this country.

The action of the Cincinnati Convention indicates a general disposition to remove this question from party issues, at least for the present. As a question of "social science"—if it be proper to use this term—the subject might at any time be appropriately discussed in a journal avowedly devoted to industrial progress; but, at the present juncture, even the most violent partisan cannot charge that we, in opening our columns to the advocacy of protection, are straying from our legitimate paths into political byways.

It is intended that the AMERICAN ARTISAN shall have decided opinions upon all subjects relating to American industry, and that it shall have the courage and independence to express its opinions without fear or favor. It has an opinion on the question of "protection *versus* free trade," which it is the object of this article to state as comprehensibly as is consistent with enforced brevity.

There are three ways in which a government can be supported, viz.:—the forcible seizure and sequestration of the property of its subjects—the barbarous way; the general levying of taxes—the civilized way; and the voluntary contributions of its citizens—the Utopian way. We have emerged from barbarism, and support our Government in the civilized way.

Now, in any system of taxation, it will, as a rule, be found practically impossible to tax production. We may do so nominally, but in effect it is only consumption and waste that pay taxes. When we place a tax on the product as it leaves the hands of the manufacturer, he adds this tax to the cost of the article, charges his percentage of profit upon the whole amount, and so transfers the burden to the purchaser.

Therefore, as the consumers pay the taxes, it is obvious that a system of taxation which influences the industries from which they derive income in such a manner as best to enable them to pay, is the most enlightened policy. We hold that a tax upon imported articles for the production of which we have equal or nearly equal natural advantages to those possessed by other nations has been proved by experience, and can be proved by argument based upon general principles to be,

for the reason above set forth, the most enlightened policy. If it enhances the price of articles of necessity and luxury, the tax paid in this way has not to be paid in any other way, and the collection of customs is far less expensive than the collection of internal revenue, while it impedes less the transaction of general business.

The taxation of imports to such an extent as enables domestic products to compete with them in the home market develops and maintains that variety of pursuits by which alone all the brain-wealth of any country can be rendered available. This variety of industrial pursuits, rendering the country independent and self-supplying in its resources, is also necessary to the security of the nation in case of war.

The limit of imposition of duties is, in our opinion, reached when domestic goods can enter the market in competition with foreign importations and obtain a fair margin of profit. To go beyond this is to create monopolies, and enrich the rich by the impoverishment of the poor.

Now, as all business is dependent for its profits not only upon natural facilities, but upon fluctuating conditions of trade, it follows that what may be ample protection at one period may be insufficient at another, or may, in the mutations of commerce, become excessive. A logical inference from these facts is that a protective tariff cannot be satisfactorily adjusted for any long period. It must be regulated as changing circumstances demand. A mere revenue tariff, too small to place home manufacturers on an equal footing with foreign producers, and which is necessarily supplemented by internal revenue, may remain fixed for a long time; but when customs are employed to regulate and encourage industry, they need constant supervision, like the brakes on a railway train. There are upward grades, dead levels, and downward grades in industry as well as on railway lines.

Let us now sum up our views on the subject, reserving discussions of separate propositions for future occasions.

The burden of taxation must perforce be borne by consumers.

That system of taxation is best which is enforced with least expense to the government, and which puts consumers into the best position to pay, by increasing general business prosperity.

A tariff which not only affords revenue, but puts home industries on equal footing with foreign, is the best system of taxation.

A protective tariff must be constantly supervised and regulated according to the exigencies of trade and industry.

To these propositions we may add a final one which is exceptional, viz.:—that whenever valid reasons exist for the establishment and maintenance of certain industries independently of the considerations of natural facilities, a tariff may and ought to be made so high as to prohibit importations of goods produced by these industries, and to place the latter on a sure and permanent footing. Thus it might be essential to the safety of a nation that the production of certain materials and munitions of war should become and remain home industries. Such a necessity would justify a prohibitive tariff.

These are briefly our views on the subject of protection from a non-partisan standpoint. As a journal reaching a large number of the producing class in America, we deem it our duty to take a broad stand on a question of such vital importance to American industry, and to aid in the dissemination of correct views regarding it. So long as nations exist they must, like individuals, take care of themselves. When—if that time, long hoped and prayed for, ever arrive—the whole human race shall become one nation, one brotherhood, the question of protection will lapse and terminate; but not till then can universal free-trade be tolerable to a majority of existing nationalities.

THE ANNUAL CONFLAGRATIONS BEGUN.

THE disasters of last year seem to be repeating themselves. From every quarter come reports of extensive fires. The extreme dryness of the spring so far has prepared everything combustible for easy ignition.

In Ulster Co., N. Y., an extensive fire is raging in the mountain forests. On the 12th of May this fire was reported as three miles in length. Birds and game were fleeing from the flames. The village of Chichester narrowly escaped burning through the united efforts of 150 men.

A disastrous fire has been burning since the 6th inst. on South Mountain, at Carlisle, Pa. It commenced in the vicinity of the Pine Grove furnaces. At last reports it was rapidly working down the mountain towards Holly Spring. A large quantity of trees have been destroyed.

From Port Jervis, N. Y., comes the news that forest fires are raging in that vicinity, and reports of fearful ravages are daily received. The conflagration is laying waste a vast extent of valuable timber land, doing incalculable damage to farms, and sweeping buildings away in many places. Every leaf and twig is as dry as a long-continued spell of hot weather can make them, and the least spark communicated to the woods is sufficient to fire acres upon acres.

In Lumberland, Forestburg, Highland, Tusten, and other towns of Sullivan, not only standing timber, but logs and manufactured lumber have been destroyed in immense quantities, and farming, lumbering, and all other occupations have for the time been suspended to fight fire. In the vicinity of Cochecton, this county presents a dreary aspect, the mountains having been burned bleak and barren.

In the vicinity of Deposit, in Delaware Co., for nearly two weeks the fires have been burning in the forests, and they appear to increase in fury rather than abate. On the lands belonging to John Luscomb and J. M. Hall, near the "Summit," along the Erie Railway, a most terrible fire is raging. On both sides of the Erie Railway track, from the Summit to near Deposit, the fires have added to the other great perils of railroading. For miles trains have been compelled to run a fiery gauntlet, the track at times being invisible for the smoke. The heat is described as almost unbearable.

Near Pine Grove fire was communicated to the woods, on Thursday, from a smoldering brush-pile which had been burned the day before, and was swept rapidly over a large tract of land. This is a fair specimen of the criminal recklessness which in a great majority of instances gives rise to these annual forest conflagrations. We can make laws to regulate trout fishing and bird shooting; why should there be no legal restrictions upon "brush burning"? Make every man who wishes to burn over a brush-field apply to the road commissioners of his township for permission to do so, and we should hear less of these "fires in the woods."

Broome County forests are also burning, and reports of similar fires are coming from Scranton, Pa., from Kingston, N. Y., from Suffolk and Queens Counties, L. I., and other quarters.

While rural districts are thus suffering, our metropolis and neighboring cities have been almost as badly injured by fire. A large number of destructive fires have occurred here since our last issue. On the evening of the 10th inst. the Cuba sugar refinery was totally destroyed by fire, with its machinery, stock, etc., the loss being estimated at $300,000. Since that time 100 families have been rendered homeless by a single fire, and several minor fires have occurred in this city.

An extensive fire in Toronto has destroyed $150,000 worth store and planing-mill property, and from all directions minor fires are reported.

In view of the dry season and the special danger arising therefrom, it behooves every one to be more than usually careful, and to avoid every unnecessary risk. Since writing the above, rain has fallen, and some of the forest fires have been thereby checked.

HIGH SPEED AND HEAVY RECIPROCATING PARTS IN ENGINES.

MANY of our readers will recollect that at the fair of the American Institute in 1869, Mr Porter, of the Allen Engine-works, in this city, exhibited a high-speed engine with very heavy reciprocating parts, which gave rise to much discussion and controversy respecting the theory upon which the engine was constructed. The engine was a model of fine workmanship, and ran remarkably well throughout the duration of the fair.

The theory of construction, as given by Mr. Porter, was considered defective by some and was sustained by others. In substance it may, perhaps, be stated concisely as follows:—The heavy connecting-rod, with the heavy piston and piston-rod, transmit their momentum to the crank, and through the latter to the fly-wheel on the approach of the crank to the line of centers, in such a way as to greatly facilitate the passing of the centers, and they also take up the sudden concussion of steam under high pressures when used expansively, and rapidly admitted to the cylinder, thereby reducing the strain upon the other parts of the engine.

While we regard this theory as correct in its main features, it appears evident that, in its application, a nice adjustment of details is requisite to secure good results. Dr. F. A. P. Barnard, President of the American Institute, a high authority in theoretical engineering, after investigation, corroborates the view here expressed, but makes other important observations. In a recent meeting of the Society of Practical Engineering, and subsequently at the Polytechnic Club of the American Institute, he gave his views as follows:—

High velocities and considerable weight in the reciprocating parts of cylinder steam-engines, working expansively, are advantageous in the following particulars:—

First, in distributing the work done with a near approach to uniformity over the circumference described by the crank in its revolution; and, secondly, in greatly reducing the irregularity of strain experienced by the working parts of the engine, especially as it respects the torsion of the shaft.

The advantage derivable from the use of heavy pistons increases with increase of weight only up to a certain point, and is dependent on the initial pressure of the steam in the cylinder, on the point of the stroke at which cut-off is made, and on the velocity of revolution.

A high-speed heavy piston engine depends, like every other reciprocating engine, upon the inertia of its fly-wheel or other rotating parts for the facility with which it passes the cen-

ters, but it taxes these regulators less than the ordinary reciprocating engine, because of the brevity of the intervals during which the effective force intermits. There must be at the beginning of the stroke a large excess of steam-pressure above that which is required to overcome the inertia of the piston, and impart to it the necessary acceleration; otherwise, the advantages derivable from this construction and mode of working will not be fully secured, and the irregularity of working of the engine may even be exaggerated. The counterpoise weight employed to balance the strain exerted toward the close of the stroke by the heavy piston upon the crank ought not to exceed one-half the weight of the reciprocating mass to which it is opposed; otherwise, immediately after the passage of the centers, the strain on the main shaft in the direction opposite the crank will be excessive, and may be injurious.

It will be seen from this statement that much engineering skill is required in this class of engines, to avoid disproportion of parts to initial pressure, point of cut off, and velocity; and in variable cut-off engines, employed in performing irregular labor, it would seem difficult, if not impossible, to apply this construction to advantage. The theory is a bold innovation upon the general practice, and the success with which Mr. Porter has applied it, as evidenced by the engine above alluded to, attests his great skill as an engineer. An engine of the same description was exhibited by him at the Paris Exposition, which attracted general attention, and elicited much comment from European engineers. We must wait for experience to demonstrate whether the advantages of the system are such as to warrant a change in the present generally approved practice.

INCREASE OF RAILWAY TRAFFIC.

THE effect of railways in creating business and unfolding undeveloped resources is most strikingly illustrated in the business of locomotive and car building at the present moment. So far as we can learn, all the manufacturers of rolling stock are overrun with orders, and the business is, notwithstanding the great advance in the price of iron, in a most flourishing state.

All the great lines are crowded with freights fully up to and in many instances beyond their capacity. Many hitherto single track lines are laying a second track to accommodate increasing business. The Lake Shore road is to be made a double track through its entire length. The Pennsylvania Central is rebuilding its eastern division, and on a large portion of the new road is laying a triple track. This increase in traffic is chiefly confined to freights, and indicates a condition of general and almost unexampled business prosperity.

THE CROTON WATER SUPPLY.

NOTWITHSTANDING the reports to the contrary, there is at present no lack of Croton water, although, should the present dry weather continue, it cannot be long before its effects will be seriously felt.

The brackish taste of the water recently complained of results from the scouring of the pipes in various parts of the city by allowing the water to flow freely through them, to remove the sediment. This is now nearly completed. The reports set afloat about quantities of dead fish in the reservoirs, etc., are all sensational fabrications.

There is, however, an incontinent waste of water throughout the city, which ought to be stopped. There are penalties for this wanton waste, and they should be rigidly enforced. It is criminal to allow faucets to leak and water to flow uselessly, when it is quite possible that the full resources at command may be needed for the extinction of fires and the preservation of property.

NEW PUBLICATIONS.

"Beck at the Farm," an absorbing Home Story, by Nell Forrest, appears in DEMOREST'S MONTHLY for June, with the usual and full display of reliable Fashions in all their details; also, an elegant portrait of the Editor, W. Jennings Demorest, in his sanctum, with a spicy biography, by Jennie June. A splendid array of other novelties both useful and entertaining. $3 per year, with a splendid chromo as a premium. Published at 838 Broadway, New York.

DEMOREST'S YOUNG AMERICA for June is on our table: it is budgetful of entertainment of the right stamp for our juveniles. "Mice at Play," by Nell Forrest, and "Just My Luck," are continued and become more interesting. $1 per year; or with a valuable premium, $1.50. Published at 838 Broadway, New York. Every boy and girl should have this valuable juvenile magazine.

MEMOIRS OF A PHYSICIAN; OR, THE SECRET HISTORY OF THE COURT OF LOUIS XV. By Alexander Dumas, author of "The Count of Monte-Cristo," "Louise Valliere," "Twenty Years After," "Forty-five Guardsmen," "The Three Guardsmen," "Diana of Meridor," "Countess of Charny," "The Queen's Necklace," "The Iron Mask," "Bragelonne," "Six Years Later," "Iron Hand."

"Memoirs of a Physician" is issued in a large octavo volume, with portrait of Dumas on cover, price $1.00, and is for sale by all Booksellers, or copies will be sent to any one, postpaid, on receipt of price, by T. B. Peterson & Brothers, Philadelphia, Pa.

Diamond Drill.

THE *Scientific Press* states that the Sutro Tunnel Company have purchased the right for manufacturing and using the diamond drill in their tunnel and all its branches. After a trial, which was completed to their satisfaction, they purchased the trial drill and this right. They expect soon to be using from eight to fourteen of these drills, and complete the work in one-half the time which it would have taken in working by hand, and at much less cost. This drill is destined to exercise an important influence in large operations in the mineral developments of the coast, doing more labor at less cost and trouble than by any other means. The Sutro Tunnel Company show their real enterprise in employing this apparatus, since they will get into the Comstock mines much quicker than they would have done without it, and save money in the bargain. Its capacity will no doubt be well tested in the work it has before it.

Copying Press.

A CLEVER application of science to commercial purposes has been made by an Italian gentleman, M. Eugenio de Zuccato, of Padua. By means of the invention any number of copies of a manuscript or design, traced upon a varnished metal plate, may be produced in an ordinary copying press. The *modus operandi* is very simple. To the bed and upper plate of a press are attached wires leading from a small battery, so that when the top of the instrument is screwed down the two metal surfaces come into contact, and an electric current passes. An iron plate resting upon the bed of the press is coated with varnish, and upon this surface is written with a steel point any communication it is desired to copy. The letters having thus been formed in bare metal, a few sheets of copying paper are impregnated with an acid solution of prussiate of potash, and placed upon the scratched plate, which is then subjected to pressure in the copying press. An electric current passes wherever the metal has been left bare (where the writing is therefore), and, the prussiate solution acting upon the iron, there is found prussiate of iron or Prussian blue characters, corresponding to those scratched upon the plate. The number of copies that may be produced by this electro-chemical action is almost unlimited, and the formation of the Prussian blue lines is, of course, instantaneous.

The Bath in Small-pox.

DR. STOKES, Regius Professor, of Dublin, says:—"We cannot doubt that the mortality in small-pox hospitals would be greatly diminished by the use of the bath. After describing a very severe case of confluent small-pox in which the patient was kept alive only by stimulants, he says the trial of the warm bath was suggested to him by Mr. Smyly. The effect was instantaneous and marvellous. The delirium ceased as if by magic. It was the delirium of pain; and the patient exclaimed, 'Thank God! thank God! I am in heaven! I am in heaven! Why didn't you do this before?' The fetor immediately and completely disappeared, so that, on entering the ward, no one could suppose that there was a case of small-pox in it. He was kept at least seven hours in the bath."

The Metropolitan Museum of Art.

THE third annual meeting of the members of the Metropolitan Museum of Art was held, on the evening of May 12, in the temporary gallery, at No. 681 Fifth Avenue, John Taylor Johnston, the President, in the chair. The trustees reported their intention of opening the gallery on Saturdays for the public. A vote of thanks was tendered to Theodore Weston, the retiring secretary, for his faithful discharge of his duties while in office. The chairman said it must be understood that contributors to the Museum were not constituted members, as there were no vacancies now, the membership being limited to 250. He then read a letter from John Henry Bard, which stated that the fine bust of Franklin, made from life by the sculptor Houdon, would be given to the Museum soon. A vote of thanks was offered to Mr. Bard for this munificent gift. The following were then chosen officers for the ensuing year:—*President*—John Taylor Johnston. *Vice Presidents*—William Cullen Bryant, Andrew H. Green, William H. Riggs, William H. Aspinwall, John A. Dix, Edwin D. Morgan, Alexander T. Stewart, Lucius Tuckerman, Daniel Huntington. *Trustees*—Theodore Roosevelt, Richard Butler, Theodore Weston. *Treasurer*—Robert Gordon. *Corresponding Secretary*—Russell Sturgis. *Recording Secretary*—Geo. P. Putnam.

THE AMERICAN WATCHMAKER'S, JEWELER'S, AND SILVERSMITH'S JOURNAL.—This is the title of a new monthly publication of which the fourth number has just been issued. It is published by Shaw & Company, 41 Park Row, New York, and its yearly subscription price is $2 50. Single copies are sold at twenty-five cents. It is a beautifully printed and ably edited technical journal, devoted to the industries indicated by its name. The appearance of the paper gives evidence that it is established on a solid basis, and its contents evince much editorial skill and care. We judge this publication is destined to fill a place never yet fully occupied in the industrial literature of this country, and we heartily wish its conductors the success they merit in their new enterprise.

EIGHTY cars a month are being made for the Chicago trade by the Michigan Central Railroad Company. A number of first-class locomotives are also in process of construction. The Illinois Central Railroad is building about fifty cars a month.

NEW AMERICAN PATENTS.

Under this head we shall give a weekly summary of the more important American and English Patents.

Differential Pulley-block.—C. Hall and E. Hubner, New York City.—*May* 7.—In this novel pulley-block is combined a grooved chain-sheave and a block-frame with a swinging guide-block. It also includes the combination of a grooved chain sheave, having two chain-grooves of different diameters, and a block-frame with two swinging guide-blocks, one for each chain-groove.

Blacking Spreader.—H. S. Kerr, Philadelphia, Pa.—*May* 7.—This new article of manufacture is constituted by the combination of a sponge, encircled centrally by a wire loop, with a shank into which it is twisted, and which is inserted in a uitable handle.

Iron Fence-post.—M. S. Manley, Philadelphia, Pa.—*May* 7.—This comprises the combination, in a hollow post, of a column or shaft of vertical strips or bars of wrought-iron or steel with intermediate wrought-iron panels, with a base or a cap, or a base and cap, each composed of one sheet or strip of metal, with a molding rolled thereon and mitered before bending.

Dividing Apparatus for condensing Carding Machines.—E. Bede, Verviers, Belgium.—*May* 7.—This apparatus is designed for cutting or dividing the sheet of wool or other fiber produced by a carding engine into small slivers, and its most noticeable feature consists of a pair of ribbed and grooved rollers or cylinders, composed each of a series of rollers mounted on a revolving shaft, and capable of sliding freely on said shaft, which are parallel to one another, and placed near enough together for the projecting circular ribs on the rollers of one shaft to engage and be pressed between the ribs of the rollers on the other shaft, so that the sheet of fiber cannot pass on the sides of the said rollers, but is divided into slivers of the breadth of the aforesaid ribs or circular projections.

Boot-heel.—F. Richardson and F. Hacker, Providence, R. I.—*May* 7.—This improved boot and shoe heel is composed of a metallic heel-shell having the exterior form and outline of a perfect heel, and provided with means of permanent attachment to the boot or shoe, and a heel-tap which is practically changeable and reversible, and is provided with separate means by which it may be conveniently attached to the heel-shell, and which will admit of its being readily detached therefrom. The invention also embraces a heel-tap composed of a plate and wooden studs, surrounded and combined with vulcanized rubber or similar compound.

Pump.—A. C. Baldwin, Washington, D. C.—*May* 7.—This inventor claims combining with the barrel or receiving chamber of a pump two or more nozzles, each of which is controlled by a cock or valve, one or more such being supplied with a hose, and the parts being suitably arranged for conjoint operation.

Apparatus for the Manufacture of Gas from Oils.—M T. Barry, Washington, D. C.—*May* 7.—Among the more essential characteristics of this improvement is the manufacture of illuminating gas from oil by discharging the latter upon the bottom of an external case or retort which is exposed to the heated gases, and then passing it through a body of heated coke, or its equivalent, supported by a grating arranged within the retort. Also, the construction of the retort with the discharge-pipe at one end and the feed-pipe near the opposite end, and an intermediate body of coke, or the equivalent thereof.

Process and Apparatus for curing Corn and other Grains.—H. H. Beach, Rome, N. Y.—*May* 7.—This invention includes a mode of curing grain and destroying the germ therein, by first subjecting the grain to the action of steam by direct contact therewith, and then drying the same. Also, an apparatus for curing grain and destroying the germ therein, composed of a steam-heating chamber in combination with a drying chamber suitably provided. Also, the arrangement of perforated steam-pipes within the steam-chamber, so as to equally diffuse the heat throughout the mass of grain. Also, in combination with a drying column of a perforated grain-receiving funnel with sides inclined at an angle of eighty degrees or thereabout to the horizontal.

Pulley.—J. J. Cornell, Newark, N. J.—*May* 7.—This is a pulley composed of two pieces of sheet-metal struck up to the required form, and having projecting tongues and holes for clinching the parts together, and a central thimble. There is also claimed the combination of the struck-up sheet-metal sections, connected together as described, with a cast-iron pulley-box, also made in two sections.

Machine for turning Shafting.—J. Fenson, Toronto, Canada.—*May* 7.—This apparatus comprises a die or cutter with a thread cut in the front portio n thereof, which gradually increases in depth until it completely runs out, leaving the back portion broad, and in the same plane as the top of the first thread. Also, the combination with a trough-like lathe-bed and the head and tail spindles which pass through the ends thereof, below the level to which the said bed may be filled with water, of a sliding tool-rest and a steady rest of appropriate construction.

Puddling and Reverberatory Furnace for the Manufacture of Iron and Steel.—I. Hersey, Fort Edward, N. Y.—*May* 7.—The gist of this invention is found in the introduction of steam into puddling, heating, and reverberatory furnaces, directly over the bridge wall, or in immediate proximity thereto.

Pipe-coupling.—D. C. Kellam, Pontiac, Mich.—*May* 7.—This device is formed by a coupling for water and steam pipes, provided at each end with an annular chamber, to receive an annular ring or packing of leather, rubber, or other suitable material, which packages are pressed within said chambers by the screw-threads of the sections of pipe to be united passing through them, and held firmly therein by the combined action of the threads and the shoulders of the chambers.

Lubricating Wad for Firearms.—S. W. Wood, Cornwall, N. Y.—*May* 7.—This is an expansible cleaning and lubricating wad of wood, papier-mâché, or similar non-metallic material for cartridges and firearms, provided with one or more cuts in its body at or near the center, for the purpose of allowing it to expand. There is also claimed such cartridge, as provided with a patch or wrapper around its periphery, for holding the lubricating substance.

Process of preserving Wooden Pavements from Rot.—A. B. Tripler, Philadelphia, Pa.—*May* 7.—In carrying this process into practice the blocks constituting the wooden pavement are saturated with a solution of chloride of arsenic, or arsenic and chloride of sodium, and coated on their upper surface with a waterproof compound. Another feature of the invention includes the interposition of an antiseptic compound between the blocks forming the pavement and the earth, by the saturation therewith of the foundation planking, or its admixture with sand.

Means of operating Valves.—W. H. Guild, Jun., Brooklyn, N. Y.—*May* 14.—This invention relates to means for reversing the throw of the valve which controls the motion of the main or driving piston in steam pumps and direct-acting steam-engines, by an independent force set in motion by the main piston, and the invention consists in a combination with said valve of a piston operated by an increase or diminution of pressure of air produced on one side of it by and during the stroke of the main piston, to suddenly throw the valve or complete its reversal at or towards the close of the stroke of the main piston.

Spring.—J. J. Fields, Brooklyn, N. Y.—*May* 14.—This invention relates to india-rubber springs for railway-cars and other purposes, and consists in a combination of a cylindrical or other shaped body of india-rubber, either solid or hollow, with an openwork frame or cage, when these two parts are so constructed as to present salient points or surfaces of contact running in direction of the length of the spring, with intervening similarly arranged or longitudinal open spaces in the walls of the cage or frame for dust or dirt to escape, as well as to provide for the distension of the rubber, and whereby cutting and choking of the latter are avoided, and is stiffened or supported throughout its length; likewise a very large and efficient resistance against pressure applied to the spring, combined with the most perfect elasticity, is obtained. A follower having longitudinal corrugations either throughout the whole or a portion of its length may be used to advantage in connection with the openwork frame or cage, constructed as described.

Pastry Machine.—W. F. Rippon, Providence, R. I.—*May* 14.—This invention consists in the combination with each other in a suitable frame of a rolling-pin, a bar carrying cutters of suitable shape for cutting cakes or crackers, anti-friction rollers, which secure the frame to a table or board in such manner as to permit its movement thereon, and a lever forming a handle, whereby a very efficient machine is produced for rolling and cutting dough or paste, and which is very simple of construction, consequently can be very cheaply manufactured.

Railway-car.—A. V. Ryder, New York City.—*May* 14.—The object of this invention is to provide in a railway car of given length double the ordinary sitting accommodation provided in a street car of usual construction, without materially adding to its width, or greatly adding to its height. To this end it consists in a novel construction of the car in three compartments, and arrangement of the seats therein, whereby the desired result is obtained.

Improvement in Telescopic Glasses.—A. V. Ryder, New York City.—*May* 14.—The object of this invention is to provide for the closer shutting up of the glasses when not in use, so that they can be conveniently carried in the pocket. To this end it consists in a bellows-like tube of flexible material, by which the socket of each object glass is connected with that of its respective sight glass in such a manner as to provide for the movement of the said glasses towards and from each other to adjust their foci. It also consists in a lazy-tongs brace and a locking device for the same, whereby the said tubes may be uniformly extended or contracted longitudinally, and the glasses moved towards or from each other, and may be locked in any desired position to retain the glasses at their proper foci.

Carpet-stretcher.—J. Lindsay, New York City.—*May* 14.—This invention consists in a carpet-stretcher composed of a pair of pincer-like levers and jaws, having combined therewith in a novel manner a third lever, which forms a single handle, and by the pulling of which, while the jaws grasp the carpet, the grasp is tightened in proportion to the force exerted in pulling, and by the pushing of which the jaws are opened and made to release the carpet.

Valve for Steam Pumps.—W. E. Kelly, New Brunswick, N. J.—*May* 14.—This invention relates to that description of valves for steam pumps and direct-acting steam-engines in which the live steam from the engine or main steam cylinder is used to throw a main valve for the purpose of reversing the stroke of the piston in said cylinder, and in which a supplementary valve operated by the steam is used for controlling the action of the main valve. The improvements consist in a novel connection of the valves or their chambers with each other and the engine or main steam-cylinder, whereby the steam or engine-piston, as it approaches either end of its stroke, uncovers a passage which establishes communication around or about the supplementary valve to the main valve, for the purpose of throwing the latter to reverse the travel of the piston, and so that, after the live steam has been thus reversed in the main cylinder, said steam throws the supplementary valve to shut off steam from the main cylinder to the main valve, and to establish communication with the exhaust for the purpose of balancing the main valve, thus accomplishing the desired automatic action of the valves in a very simple and efficient manner. The improvements also consist in a hollow construction of the supplementary valve, whereby the steam after it has performed its duty on the main valve is exhausted through the supplementary valve.

Screw-cutting Machine.—John J. Grant, Greenfield, Mass.—*May* 14.—This invention consists in a circularly adjustable headstock, having a number of independent die-holders arranged around its axis or center, and capable of being independently revolved by adjustment of the headstock, so as to bring any one of the die-holders, by gears with which they are provided, in connection with a gear-wheel or pinion on a driving-shaft, common to each of the die-holders, in succession or as required. By this combination of devices increased facility is afforded for cutting different pitches or sizes of screw-threads in the same machine without removing the dies from the headstock.

OFFICIAL LIST OF PATENTS

ISSUED FROM THE UNITED STATES PATENT OFFICE

For the Week ending May 14, 1872,

AND EACH BEARING THAT DATE.

[*Reported officially for the "American Artisan."*]

126,619.—Potato-digger.—B. Avis, Penn's Grove, N. J.

126,620.—Clock Attachment to Gas-burners.—P. C. Bensel, New York City.

126,621.—Knitting Machine.—J. Bradley, Lowell, Mass.

126,622.—Paper Doll.—J. T. Brown, Albion, asgr. of one-half his right to H. G. Stevens, Hudson, N. Y.

126,623.—Liquid Meter.—H. Chandler, Buffalo, N. Y.

126,624.—Gasket packing.—G. W. Coffee, asgr. to himself and J. W. Tucker, San Francisco, Cal.

126,625.—Lamp for burning the Vapor from Hydrocarbon Oils.—J. Cook, New York City.

126,626.—Fluid Meter.—J. Dooling, Boston, Mass.

126,627.—Circuit-closer for Electro-magnetic Apparatus.—M. G. Farmer, Salem, Mass.

126,628.—Electro-magnetic Engine.—M. G. Farmer, Salem, Mass.

126,629.—Sliding-screen for Windows.—J. L. Field, Philadelphia, Pa.

126,630.—Bedstead-fastening.—C. M. Gilbert, Philadelphia, Pa.

126,631.—Method of stitching Covers on Whip-handles.—D. N. Goff, Westfield, Mass.

126,632.—Meat-chopping Machine.—J. L. Good, Elizabethtown, Pa.

126,633.—Picture-frame.—L. N. B. Gray, asgr. of one-half his right to D. A. Reed, Boston, Mass.

126,634.—Machine for heading Pickets.—H. D. Heiser, H. F. Snyder, and G. S. Snyder, asgrs. to H. F. Snyder and G. S. Snyder, Williamsport, and A. Snyder, Freeport, Pa.

126,635.—Hose-bridge.—L. W. Hodges, Wilmington, N. C.

126,636.—Muff-box.—R. S. Jennings, Philadelphia, Pa. Antedated April 25, 1872.

126,637.—Medical Compound.—J. Kornitzer, New York City.

126,638.—Butter-worker.—R. Lapham, asgr. to P. P. Todd, New York City

126,639.—Rotary Blower.—T. Leffel, Springfield, Ohio.

126,640.—Self-lighting Lamp.—W. A. Leonard, asgr. to E. O. Presby and E. J. Lane, Boston, Mass.

126,641.—Butter-stamp.—T. Mabbett, Jr., Vineland, N. J. Ante-dated April 24, 1872.

126,642.—Rose for Door-knobs.—W. H. Mattson, Philadelphia, Pa.

126,643.—Pump.—J. Mayher, East Hampton, Mass.

126,644.—Bench-hook.—J. W. McGill, New York City.

126,645.—Cotton-bale Tie.—W. McNabb, No. 6 Cambridge Terrace, London Road, Clapton, England.

126,646.—Die for forming Blanks for Carriage-clips.—F. B. Morse, asgr. to H. D. Smith & Co., Plantsville, Conn.

126,647.—Hinge.—J. K. Otis, East Cambridge, asgr. to himself and F. W. Nichols, Lynn, Mass.

126,648.—SLOP-PAIL.—J. G. Roth, New York City.
126,649.—HARNESS-BUCKLE.—S. S. Sargeant, Newark, N. J.
126,650.—HINGE.—W. R. Searle, East Hampton, Mass.
126,651.—AUTOMATIC OILER FOR STEAM-ENGINES.—T. Sims, Philadelphia, Pa.
126,652.—GAS GENERATOR AND CARBURETER.—J. H. Steiner, Cincinnati, Ohio.
126,653.—COMPOUND FOR FILLING THE PORES OF WOOD.—N. Sutges, Bordentown, N. J.
126,654.—HINGE.—E. Swan, New Bedford, Mass.
126,655.—PLOW-COLTER.—B. W. Tuttle, Galena, Ill.
126,656.—PLOW.—B. W. Tuttle, Galena, Ill.
126,657.—GLOVE-CLASP.—J. L. Weir, Indianapolis, Ind.
126,658.—CULTIVATOR.—W. H. Vick, Holly Springs, Miss.
126,659.—DESK PAPER-CUTTER.—J. W. Wetmore, Erie, Pa.
126,660.—MACHINE FOR MAKING STAPLES.—A. Whittemore, Cambridgeport, Mass.
126,661.—HAIR-TURNING HATCHEL.—Louise Wilbur, Watertown, N. Y.
126,662.—ROOFING COMPOSITION.—W. W. Wilcox, Buffalo, N. Y.
126,663.—PROCESS AND APPARATUS FOR THE MANUFACTURE OF INDIGO.—(Div. A.)—T. T. Woodruff, asgr. of one-half his right to E. S. Morris, Philadelphia, Pa.
126,664.—PROCESS AND APPARATUS FOR THE MANUFACTURE OF INDIGO.—(Div. B.)—T. T. Woodruff, assgr. of one-half his right to E. S. Morris, Philadelphia, Pa.
126,665.—MANUFACTURE OF INDIGO.—(Div. C.)—T. T. Woodruff assgr. of one-half his right to E. S. Morris, Philadelphia, Pa.
126,666.—CURTAIN-FIXTURE.—J. L. Young, New York City.
126,667.—CIRCULAR-SAW MILL.—N. Zierden, asgr. to himself, H. F. Snyder, and G. S. Snyder, Williamsport, and A. Snyder, Freeport, Pa.
126,668.—GAUGES FOR SPLITTING LEATHER.—J. N. Baird, Bloomfield, Iowa.
126,669.—MITER-BOX.—J. W. Bower, Greencastle, and A. D. Mohler, Huntington, Ind.
126,670.—GRAIN-SEPARATOR FOR THRASHING MACHINES.—J. W. Breese, Canandaigua, Mich.
126,671.—FLY-TRAP.—M. V. Bulla, South Bend, Ind.
126,672.—WASHING MACHINE.—E. L. Bullock and W. Tuller, Hartford, and S. Kinney, Jr., Windsor, Conn.
126,673.—MACHINE FOR CUTTING SHOE-WELTS.—J. H. Busell, asgr. to H. E. Townsend, Boston, Mass.
126,674.—WATER-WHEEL.—T. Chesher, West Middleburg, Ohio.
126,675.—SPRING BED-BOTTOM.—N. W. Clark, asgr. to himself and C. S. Linabury, Clarkston, Mich.
126,676.—COAL-HOD STAND.—W. M. Conger, Newark, N. J.
126,677.—BRUSH FOR DUST-PANS.—W. M. Conger, Newark, N. J.
126,678.—STOVE-PLATFORM.—W. M. Conger, Newark, N. J.
126,679.—SCREW-PRESS.—J. J. Crawford, Lowell, Mass.
126,680.—CORN-POPPER.—A. F. Curtis and O. N. Palmer, Delaware, Ohio.
126,681.—HORSE-COLLAR CAP.—D. Curtis, Sun Prairie, Wis.
126,682.—LINING FOR HORSE-COLLARS.—D. Curtis, Sun Prairie, Wis.
126,683.—GRAIN-SEPARATOR.—J. L. Custer, Bonaparte, Iowa.
126,684.—TUCK-CREASER FOR SEWING-MACHINES.—P. Doran, asgr. of two-thirds of his right to A. E. Bolster and K. D. Pierce, Chicago, Ill.
126,685.—FURNACE FOR SOLDERING TIN CANS.—G. W. Fisher, Baltimore, Md.
126,686.—NAIL-EXTRACTOR.—E. A. Franklin, Brenham, Tex.
126,687.—COTTON-BALE TIE.—E. A. Franklin, Brenham, Tex.
126,688.—SAFETY DERRICK LAMP.—H. Freeman, Petroleum Center, Pa.
126,689.—BOLT-THREADING MACHINE.—G. W. Frosst, asgr. to Archer, Goodwin & Co., Richmond, Va.
126,690.—MODEL-STAND FOR ARTISTS.—G. A. Gilbert, New York City.
126,691.—MACHINE FOR MANUFACTURING ICE CREAM.—C. Gooch, Cincinnati, Ohio.
126,692.—CAP-BOX.—A. F. Gove, asgr. of one-half of his right to J. H. Batchelder, Lincoln, Vt.
126,693.—LAMP-CHIMNEY CLEANER.—L. Granger, Armada, Wis.
126,694.—ATTACHING KNOBS TO THEIR SPINDLES.—A. G. Gray, St. John, Canada.
126,695.—HEATING AND COOKING RANGE.—W. A. Greene, Brooklyn, N. Y.
126,696.—JET-CONDENSER FOR STEAM-ENGINES.—G. W. Hall, Havana, N. Y.
126,697.—WHIP-SOCKET.—S. C. Hamlin, Ypsilanti, Mich.
126,698.—COMPOSITION FOR COVERING CIGAR-TIPS.—J. H. Harris, Pittsfield, Mass.
126,699.—STEAM BOILER.—S. Harris, Washington, D. C.
126,700.—PILE OINTMENT INJECTOR.—L. Heins, Brunswick, Ga.
126,701.—CANAL-BOAT PROPULSION.—I. J. Hilgerd, New York City.
126,702.—CAR-COUPLING.—C. L. Horack, Hastings, Minn.
126,703.—CHAIR.—C. B. Howard, Atlanta, Ga.
126,704.—DRIVING BIT.—C. Huie, New York City.
126,705.—HARVESTER-RAKE.—W. H. Hurlbut, Mirabile, Mo.
126,706.—EMERY WHEEL.—W. S. Jarboe, New York City, asgr. to himself and J. F. Wood, Boston, Mass.
126,707.—PLANE.—C. Jensen, Boston, Mass.
126,708.—MANUFACTURE OF STEEL.—J. J. Johnston, Columbiana, Ohio, asgr. to S. D. Hubbard & Co., Pittsburg, Pa.
126,709.—MANUFACTURE OF IRON.—J. J. Johnston, Columbiana, Ohio, asgr. to S. D. Hubbard & Co., Pittsburg, Pa.
126,710.—PUDDLING IRON.—J. J. Johnston, Columbiana, Ohio, asgr. to S. D. Hubbard & Co., Pittsburg, Pa.
126,711.—BOTTLE-CAPPING MACHINE.—A. C. Jordan, New York City.
126,712.—HORSESHOE NAIL.—J. Jorey, Norwich, Conn.
126,713.—BLIND-SLAT.—D. Kelly, Muskegon, Mich.
126,714.—SWITCH FOR PRINTING TELEGRAPHS.—P. Kenny, New York City.
126,715.—LANDAU CARRIAGE-DOOR.—H. Killam, New Haven, Conn.
126,716.—SCREW-DRIVER.—J. A. King, asgr. to himself and J. L. Peck, Jamaica, N. Y.
126,717.—PURIFYING GAS.—W. T. Kosinski, assignor of one-third of his right to G. W. Gill, Philadelphia, Pa.
126,718.—COAT.—H. Kuhlman, Boston, Mass.
126,719.—MIDDLINGS SEPARATOR.—E. N. La Croix, Minneapolis, Minn.
126,720.—FRONT-GEAR FOR CARRIAGES.—C. L. Leonard, Wells's Bridge, N. Y.
126,721.—AUTOMATIC SEED-PLANTER.—D. Lorriaux, Ottawa, Ill.
126,722.—APPARATUS FOR AGING WINES AND LIQUORS.—A. Luquet and P. Huerne, San Francisco, Cal.
126,723.—BAG-HOLDER.—E. L. Lyon, Steamburg, N. Y.
126,724.—CAR-COUPLING.—J. L. Mareness, Constantine, Mich.
126,725.—CHURN.—J. Mayes, Oxford, N. Y.
126,726.—CLOVER-HARVESTER.—C. McCombie, Carrolltown, Pa. Ante-dated May 1, 1872.
126,727.—BAND-SAW GANG.—W. J. McLane, asgr. to himself and H. Silliman, New York City.
126,728.—BRICK MACHINE.—J. N. McLean and J. Bennor, Philadelphia, Pa.
126,729.—EXCAVATOR.—E. B. Meatyard, Chicago, Ill.
126,730.—WATER-ACCELERATOR.—E. B. Meatyard, Chicago, Ill.
126,731.—COTTON-PRESS.—J. W. Miller, Shannon, Miss.
126,732.—BAG-FILLER.—W. H. Mitchell and J. G. Mitchell, Circleville, Ohio.
126,733.—SASH-ELEVATOR AND LOCK.—M. W. Montgomery, Cleveland, Ohio.
126,734.—BOW FOR ARCHERY.—E. S. Morton, Plymouth, Mass.
126,735.—DISH-WASHER.—S. D. Moxley, Keeseville, N. Y.
126,736.—BEER-FAUCET.—L. Mullenhoff, Buffalo, N. Y.
126,737.—WINDOW-SCREEN.—C. A. Pease, Boston, Mass.
126,738.—DEVICE FOR MILLING WIRE.—N. C. Perry, Chester, Conn.
126,739.—BEE-HIVE.—P. O. Petersen, Oakland, Cal.
126,740.—SCROLL-SAWING MACHINE.—J. D. Powers, Orwell, Vt.
126,741.—ELASTIC WHEEL FOR VEHICLES.—G. M. Ramsay, New York City.
126,742.—AXLE FOR CARRIAGE-WHEELS.—G. W. Ray, Rankin's Depot, Tenn.
126,743.—SPRING BED-BOTTOM.—M. A. Richardson, Sherman, N. Y.
126,744.—ORE-WASHER.—W. T. Rickard, Monitor, Cal.
126,745.—EARTH-CLOSET.—N. P. Rider, Mandeville, La.
126,746.—CHECK-REIN.—R. B. Robbins, Adrian, Mich.
126,747.—TICKET-HOLDER.—J. W. Rockafellow, Stockton, N. J.
126,748.—BREECH-LOADING FIREARM.—C. F. Russel, asgr. to himself and J. B. Haines, New Haven, Conn.
126,749.—GRAIN METER.—R. Rutherford, asgr. to himself and J. Messenger, Belleville, Ill.
126,750.—PACKING-CASE FOR OIL AND OTHER CANS.—T. Scantlin, asgr. to himself and J. M. Scantlin, Evansville, Ind.
126,751.—CORN-PLANTER.—J. Selby, Peoria, Ill.
126,752.—WATER-WHEEL.—L. M. Sharps, Alanthus Grove, Mo.
126,753.—TRACE-CARRIER.—P. A. Snyder, Butlerville, Ohio.
126,754.—FASTENER FOR MEETING-RAILS OF SASHES.—W. E. Sparks, asgr. to Sargent & Co., New Haven, Conn.
126,755.—SEWING-MACHINE.—C. Stebbins, Pike, N. Y.
126,756.—STREET-CAR.—(Case B.)—J. Stephenson, New York City.
126,757.—STREET-CAR.—(Case D.)—J. Stephenson, New York City.
126,758.—METAL-TURNING LATHE.—M. G. Stolp, Ithaca, N. Y.
126,759.—SEWER-TRAP.—C. Stubenbord, New York City.
126,760.—PADDLE-WHEEL.—J. S. Swann, Kanawha County, West Va. Ante-dated April 27, 1872.
126,761.—MAGNETIC INDICATOR FOR TEACHING, ETC.—J. Unna, asgr. to A. Roman & Co., San Francisco, Cal.
126,762.—LOCK-NUT AND AXLE FOR VEHICLES.—T. F. Van Keuren, Saugerties, N. Y.
126,763.—COOKING-STOVE.—T. White, Quincy, Ill.
126,764.—BAND-SAWING MACHINE.—B. D. Whitney, Winchendon, Mass.
126,765.—CANDLESTICK.—J. Williams, San Mateo, Cal.
126,766.—FASTENING FOR NECK-TIES.—C. Winterbottom, Philadelphia, Pa.
126,767.—COMBINED WALKING-STICK AND STOOL.—C. G. Young, Fenton, Mich.
126,768.—MACHINE FOR SAWING FELLIES.—J. B. Zimmerman, Fort Seneca, Ohio.
126,769.—WATER PIPE.—D. Allen, asgr. of one-half of his right to P. Aylsworth, Bloomington, Ill.
126,770.—APPARATUS FOR GENERATING GAS AND VAPORS FROM PETROLEUM.—A. I. Ambler, Washington, D. C., asgr. of one-half of his right to J. Butler, New York City.
126,771.—REVOLVING REFRIGERATOR.—C. Avery and G. D. Atkins, Erie, Pa.; said Atkins assigns his right to said Avery.
126,772.—BOLT-HOLDER FOR RAILROAD-RAILS.—De W. C. Baker, Fulton, N. Y.
126,773.—POST-HOLE DIGGER.—W. E. Ball, Bethesda, Ohio.
126,774.—CLOTHES-WRINGER.—C. W. Bassett, Newton, asgr. to Haley, Morse & Co., Boston, Mass.
126,775.—PAINT-CAN.—L. U. Bean and H. A. Stevenson, Philadelphia, Pa.
126,776.—WOOD PAVEMENT.—G. A. Beidler, Philadelphia, Pa.
126,777.—GRATE FOR STOVES AND FURNACES.—N. A. Boynton, New York City.
126,778.—COUNTER FOR BOOTS AND SHOES.—J. Brackett, Lynn, Mass. Ante-dated April 30, 1872.
126,779.—HARROW.—T. E. C. Brinly, Louisville, Ky.
126,780.—WASHING MACHINE.—A. Brown, Bloomington, Ill.
126,781.—GLOVE.—C. J. Brown, Plymouth, N. H.
126,782.—ELLIPSOGRAPH.—A. W. Browne, asgr. to himself and C. P. Ladd, Bloomfield, N. J.
126,783.—STREET-LAMP.—A. Burger, New York City.
126,784.—REFRIGERATOR.—H. C. Cain, Cleveland, Ohio.
126,785.—ALARM FOR MONEY-DRAWERS.—J. M. Case, Lansing, Mich.
126,786.—WATER-WHEEL.—S. P. Castle and O. H. Castle, asgrs. to themselves and M. H. Crane, Urbana, Ohio.
126,787.—RAILWAY.—J. H. Connelly, asgr. of one-half his right to J. C. Tilton, Pittsburg, Pa.
126,788.—CORN-PLANTER.—W. H. Crosby, Parish, N. Y.
126,789.—SCRUBBING-TOOL.—F. Deike and M. Helmstadt, New York City.
126,790.—FIFTH-WHEEL FOR VEHICLES.—J. Du Bois, Kingston N. Y.
126,791.—VAGINAL SYRINGE.—A. M. Dye, Elkhart City, Ill.
126,792.—DETACHABLE ERASER FOR PENCILS.—W. K. Evans, New York City.
126,793.—HEMP-HARVESTER.—O. Farra, Jessamine County, Ky.
126,794.—CAR-SPRING.—J. J. Fields, Brooklyn, N. Y.
126,795.—DEEP-SEA SOUNDING APPARATUS.—H. Fladd, St. Louis, Mo.
126,796.—EXERCISING LIFT.—R. Forward, Cincinnati, Ohio.
126,797.—VENTILATOR FOR RAILWAY-CARS.—T. W. Freeborn, Newport, R. I.
126,798.—APPARATUS FOR MAKING SOAP.—R. Freeland, Montreal, Canada.
126,799.—LUBRICATOR.—W. T. Garratt, San Francisco, Cal.
126,800.—LIFTING-JACK.—A. M. Gilmore, Greenburg, Ind.
126,801.—BED-BOTTOM.—E. T. Gilmore, Westborough, Mass.
126,802.—BOLT-THREADING MACHINE.—J. J. Grant, Greenfield Mass.
126,803.—APPLE-PARER.—W. M. Griscom, asgr. to Harbster Bros. & Co., Reading, Pa.
126,804.—OPERATING VALVE OF STEAM-ENGINES.—W. H. Guild, Jun., Brooklyn (E. D.), N. Y.
126,805.—CLASP FOR SECURING KNOBS TO THEIR SHANKS.—J. W. Haines, Cambridge, Mass.
126,806.—ROTARY ENGINE.—J. E. Hanger, Richmond, Va.
126,807.—BREAD-CUTTER.—C. Hansen and P. Andersen, Racine, Wis.
126,808.—WOOD-SAWING MACHINE.—F. L. Hartenstein and S. Hyman, Nashville, Tenn.
126,809.—BASE FOR ARTIFICIAL TEETH.—F. Hickman, Reading, Pa. Ante-dated April 30, 1872.
126,810.—CARRIAGE-WHEEL HUB.—C. C. Holt, Lawrence, Mass.
126,811.—SAFETY-PIN.—R. W. Huston, Washington, D. C.
126,812.—MODE OF CUTTING SOLES FOR BOOTS AND SHOES.—G. James, Montreal, Canada, asgr. to Woodley Heel and Sole Cutting Company, New Haven Conn.
126,813.—CARDING MACHINE.—C. Jones, Yonkers, N. Y.
126,814.—STEAM-PUMP.—W. E. Kelly, New Brunswick, N. J.
126,815.—CULTIVATOR.—W. Kleffel, Maple Creek, Neb.
126,816.—TREATING WOOD FOR THE MANUFACTURE OF SLEEVE-BUTTONS, ETC.—O. Knipfer, asgr. to C. Spooner, Bridgeport, Conn.
126,817.—STUMP-PULLER.—I. Larrance, Cincinnati, Ohio.
126,818.—CARPET-STRETCHER.—J. Lindsay, New York City.
126,819.—FASTENING FOR CHESTS AND BOXES.—J. H. Marvil, Laurel, Del.
126,820.—REFRIGERATOR.—J. Marx, New York City.
126,821.—COMBINED HOE AND RAKE.—W. M. McLendon, Greenville, Ga.
126,822.—MANUFACTURE OF SHOES.—W. J. B. Mills, Philadelphia, Pa., asgr. to DeW. C. Taylor, trustee, New York City.
126,823.—MOLD FOR BOOT AND SHOE SOLES.—W. J. B. Mills, Philadelphia, Pa., asgr. to DeW. C. Taylor, trustee, New York City.
126,824.—LAST FOR SHOES.—W. J. B. Mills, Philadelphia, Pa., asgr. to DeW. C. Taylor, trustee, New York City.
126,825.—PATTERN FOR CUTTING GARMENTS.—Sarah A. Millwee, Greenwood, S. C.
126,826.—GRAIN-DRILL.—J. Milton, Hillsborough, Va.
126,827.—TOY-BLOCK.—Elizabeth H. Muldaur, Dover, Del.
126,828.—CULTIVATOR.—W. H. Murrey, asgr. of one-half his right to S. M. Gosling, Brodhead, Wis.
126,829.—BOBBIN-WINDER FOR SEWING-MACHINES.—W. H. Newton, Newport, R. I.
126,830.—PREPARING GOLD FOR DENTISTS' USE.—G. J. Pack, New York City.
126,831.—EXTENSION TABLE.—J. Pleukharp, Columbus, Ohio.
126,832.—SEAT FOR VEHICLES.—J. Richert, Madison, Ind.
126,833.—DOUGH ROLLER AND CUTTER.—W. F. Rippon, Providence, R. I., asgr. to himself and E. Cook.
126,834.—STEAM-PUMP.—G. J. Roberts, Dayton, Ohio.
126,835.—CURTAIN FIXTURE.—A. Roeloss, Philadelphia, Pa. Ante-dated May 6, 1872.
126,836.—SHOE.—J. A. Rose and G. I. Mason, Prairie City, Ill.
126,837.—RAILWAY CAR.—A. V. Ryder, New York City. Ante-dated May 6, 1872.
126,838.—SPY-GLASS ADJUSTMENT.—A. V. Ryder, New York City. Ante-dated April 30, 1872.
126,839.—HARVESTER-RAKE.—E. M. Smith, asgr. to Mitchell, Vance & Co., New York City.
126,840.—BASE-BURNING STOVE WITH CENTRAL AIR-PASSAGES.—E. Smith, Albany, N. Y.
126,841.—METALLIC COLUMN.—F. H. Smith, Baltimore, Md.
126,842.—TRACTION ENGINE.—J. H. Smith, Shell Mound, Miss.
126,843.—SAW-MILL.—J. H. Smith, Shell Mound, Miss.
126,844.—FEEDING MECHANISM FOR SEWING-MACHINES.—D. M. Smyth, Orange, N. J., asgr. to Stickler, Elliott & Wilson New York City.
126,845.—FEEDING MECHANISM FOR SEWING-MACHINES.—D. M. Smyth, Orange, N. J., asgr. to Stickler, Elliott & Wilson, New York City.
126,846.—FACE-PLATE AND STRIKE FOR LOCKS.—J. M. Spring, New Britain, Conn., asgr. to P. & F. Corbin.
126,847.—DUPLEX TELEGRAPH APPARATUS.—J. B. Stearns, Boston, Mass.
126,848.—DUPLEX AGRAFFE SCALE FOR PIANO-FORTES.—C. F. T. Steinway, New York City, asgr. to himself, A. Steinway, and W. Steinway.
126,849.—CAR-COUPLING AND BUFFER.—A. Stevens, Portland, Me.
126,850.—HINGE.—S. Stiger, New York City.
126,851.—GAS-PROOF CLOTH.—W. B. S. Taylor, New York City.
126,852.—SOLDERING-TOOL.—J. A. Tillary and S. A. Ewalt, Baltimore, Md.
126,853.—BALING-PRESS.—F. B. Wal-in, Saugatuck, Mich.
126,854.—VENTILATED HAT, AND BLOCK FOR FORMING.—W. F. Warburton, Philadelphia, Pa.
126,855.—COMPOUND FOR USE IN CONSTRUCTING WATER-CISTERNS.—D. H. Weeks, Vassalborough, Maine.
126,856.—PLOW.—L. Weeks and J. S. Trimble, Shelby, Ohio.
126,857.—WINDOW-GARDEN.—H. Whittemore, Tappantown, N. Y.
126,858.—SHUTTER-FASTENER.—W. W. Williams, Worcester, and C. E. Williams, Clinton, Mass.
126,859.—DUMPING-CAR.—J. C. Wiswell, Lenoxville, Canada, and F. A. Wiswell, Beebe Plain, Vt.; said J. C. Wiswell, asgr. to said F. A. Wiswell.
126,860.—THREAD-CUTTER FOR SEWING-MACHINES.—C. H. Wolcott, Jamestown, N. Y.
126,861.—PRODUCING PICTURES FROM PHOTOGRAPHIC AND OTHER NEGATIVES.—W. B. Woodbury, Cliff House, Greenhithe, England.
126,862.—BED-LOUNGE.—L. Wunsch, H. Stuhlreyer, and J. Schwarz, Cincinnati, Ohio.

RE-ISSUES.

4,899.—COMPOSITION FOR INDELIBLE PENCILS.—E. P. Clark, Holyoke, Mass. Patent No. 24,195, dated May 31, 1859.

4,900.—AIR-TIGHT JOINT FOR GAS-RETORTS.—C. F. Dieterich and A. Schüssler, New York City. Patent No. 115,586, dated June 6, 1871.

4,901.—CURTAIN-FIXTURE.—H. H. Phillips, Buffalo, N. Y. Patent No. 124,151, dated Feb. 27, 1872.

4,902.—WRENCH.—G. C. Taft, asgr. to L. Coes, Worcester, Mass. Patent No. 88,230, dated March 23, 1869; re-issue No. 3,918, dated April 12, 1870.

4,903.—TOURNURE.—A. W. Thomas, Philadelphia, Pa. Patent No. 114,624, dated May 9, 1871.

4,904.—CARPET.—W. Wallace, asgr. to himself and C. McAllister, Philadelphia, Pa. Patent No. 104,232, dated June 14, 1870.

4,905.—HARVESTER-RAKE.—C. Wheeler, Jun., asgr. of C. J. Arlington, Auburn, N. Y. Patent No. 79,539, dated July 7, 1868.

4,906.—MACHINE FOR THREADING BOLTS.—S. H. Wright, asgr., by mesne-assignment, to J. Hope, R. H. Butcher, and J. Minter, Lowell, Mass. Patent No. 119,681, dated Oct. 3, 1871.

DESIGNS.

5,846.—COUPE.—W. H. Bradley, New Haven, Conn.

5,847 and 5,848.—CARPET-PATTERN.—J. H. Bromley, asgr. to J. Bromley & Sons, Philadelphia, Pa.

5,849.—CARPET-PATTERN.—J. Fisher, Enfield, asgr. to Hartford Carpet Co., Hartford, Conn.

5,850.—CARPET-PATTERN.—O. Heinigke, New York City, asgr. to Hartford Carpet Co., Hartford, Conn.

5,851.—PENCIL-CASE.—W. S. Hicks, New York City.

5,852 and 5,853.—CARPET-PATTERN.—E. J. Ney, New York City, asgr. to Hartford Carpet Co., Hartford, Conn.

5,854.—GROUP OF STATUARY.—J. Rogers, New York City.

5,855.—CARPET-PATTERN.—J. H. Smith, Enfield, asgr. to Hartford Carpet Co., Hartford, Conn.

5,856.—MATCH BOX.—H. Sommer, Jun., Newark, N. J.

5,857.—PHOTOGRAPH.—J. G. Stewart, Carlinville, Ill.

5,858.—COAT AND HAT HOOK.—A. B. Tanner, asgr. to Sargent & Co., New Haven, Conn.

5,859.—COOKING-STOVE.—N. S. Vedder, Troy, and T. S. Heister, Lansingburg, N. Y., asgrs. to W. N. Moore, Joliet, Ill.

TRADE-MARKS.

811.—HAME.—Baker, Carr & Co., Andover, N. H.

812.—TEAS.—Castle Brothers, San Francisco, Cal.

813.—BAKING-POWDER.—G. F. Gantz, New York City.

814.—WILD BLACKBERRY BITTERS.—I. Landsberger & Co., San Francisco, Cal.

815.—CIGAR.—E. Parodi, Key West, Fla.

816.—COUGH-SIRUP.—J. S. Pemberton, Atlanta, Ga.

817.—MEDICINE.—Pettit & Barker, Fredonia, N. Y.

818.—COAL.—G. R. Tuttle, Cleveland, Ohio.

819.—PLOW, CULTIVATOR, ETC.—Wiard & Hugh, East Avon, N. Y.

820.—COMPOUND FOR STUFFING LEATHER.—J. B. Young, Chicago, Ill.

EXTENSIONS.

20,243.—FINGER OR GUARD FOR HARVESTERS.—L. Miller. C. Aultman & Co., assignees. May 11, 1858.

20,192.—EXPANSIVE BIT.—W. A. Clark. May 11, 1858; re-issued June 22, 1869; again re-issued Nov. 16, 1869; again re-issued Dec. 12, 1871, No. 4,668.

20,245.—GUIDE FOR SEWING-MACHINES.—L. W. Serrell. J. Harold, assignee. May 11, 1858.

APPLICATIONS FOR EXTENSIONS.

OPPONENTS of extensions must file *written* objections in the Patent Office at least 20 days before the day-of-hearing; and on that day, at noon, they must appear personally, or by proxy, at the Patent Office, and state the reasons of their opposition. All testimony—*pro* or *con*—must be taken and transmitted in accordance with the official rules, which will be furnished on application. The under-named patentees have recently petitioned for extensions (for seven years) of patents granted to them in the year 1858:—

STEPHEN W. HALL, Williamsport, Pa.—*Machine for cutting Miters.*—Patented Aug. 17, 1858; testimony will close on July 16, next; last day for filing arguments and examiner's report, July 26; day-of-hearing, July 31.

CHARLES W. MARSH, De Kalb, and WILLIAM W. MARSH, Sycamore, Ill.—*Reaping Machine.*—Patented Aug. 17, 1858; re-issued July 5, 1864; and again re-issued in two divisions, June 27, 1865; testimony will close on July 16, next; last day for filing arguments and examiner's report, July 26; day-of-hearing, July 31.

FRANCIS M. SWEET, Newark, N. J.—*Bracelet.*—Patented Aug. 31, 1858; testimony will close on July 30, next; last day for filing arguments and examiner's report, Aug. 9; day-of-hearing, Aug. 14.

ENGLISH PATENT JOURNAL.

LIST OF APPLICATIONS FOR PATENTS

ON WHICH

Provisional Protections

HAVE BEEN OBTAINED IN ENGLAND BY OR FOR AMERICAN INVENTORS.

[*This list is condensed weekly from the "Journal of the British Commissioners of Patents," expressly for the* "AMERICAN ARTISAN."]

680.—MANUFACTURE OF SUGAR.—J. A. Morrell, New York City.—March 5, 1872.

864.—BUTTON-HOLE SEWING-MACHINE.—A. L. Wood, Boston, Mass.—March 21, 1872.

1,012.—ELECTROTYPE MOLD.—S. P. Knight, Brooklyn, N. Y.—April 5, 1872.

1,109.—COMPOSITOR'S TYPE-CASE.—R. M. Hoe, New York City.—April 13, 1872.

1,110.—LAMP.—T. Hartley, Philadelphia, Pa.—April 13, 1872.

1,111.—PUDDLING FURNACE.—S. Danks, Cincinnati, Ohio.—April 13, 1872.

1,131.—SEWING-MACHINE.—D. McC. Smyth, Orange, N. J.—April 16, 1872.

1,133.—ARTIFICIAL BREAST.—C. G. Carrao, Boston, Mass.—April 16, 1872.

1,136.—PRESERVING ANIMAL SUBSTANCES.—J. McComb, New Orleans, La.—April 17, 1872.

1,140.—APPARATUS FOR EXTRACTING OIL, ETC.—E. S. Hutchinson, Baltimore, Md.—April 17, 1872.

1,145.—DISTILLING APPARATUS.—Thompson & Olson, Brooklyn, N. Y.—April 17, 1872.

1,135.—MANUFACTURE OF IRON BARS, ETC.—Jean Caumon (also known as J. Absterdam), New York City.—April 17, 1872.

1,139.—STEAM-TRAP.—Blessing, Townsend & Jackson, Albany, N. Y.—April 17, 1872.

ANSWERS TO CORRESPONDENTS.

J. A. H., OF OHIO.—Design patents cover nothing but the shape of an article. Whatever can be covered by a design patent is not a proper subject for an invention patent. Design patents are as good in their way as invention patents. They cannot be extended.

A. R. J., OF MICH.—Double plows have been used with rollers in place of the ordinary land side. The rollers so greatly reduce the friction that it is said three horses can do twice the work of two with the old-style plow. Considerable discussion has recently taken place in regard to these plows in England, and decidedly favorable opinions have been expressed in regard to them. No doubt, if Yankee genius should attempt something in this field, the results would justify the effort.

P. R. B., OF OHIO.—To test the presence of salts of lead in paper collars, moisten one with pure water, and place it over a sink or privy vault. If lead is present, the sulphureted hydrogen arising from the decaying matter will in a few hours turn it either a dark brown or black if the test is prolonged sufficiently.

L. H. M., OF WIS.—The horse-power of a boiler is measured by the amount of water it will convert into dry steam in a given time. One cubic foot of water evaporated per hour is the usual estimate for one horse-power where steam is used non-expansively. When high steam is greatly expanded, the amount of evaporation per hour is much less than this.

R. L. P., OF VT.—The amount of fuel required to evaporate a given amount of water, under otherwise constant conditions, and independent of loss by radiation, is the same for all pressures under which the evaporation takes place.

L. P. C., OF N. J.—Animal oil, naphtha, and bisulphide of carbon are solvents of india-rubber.

H. A., OF PA.—The loss of fuel from imperfect combustion in your furnace must be enormous. Judging from your description of the dense black smoke which issues from the chimney, there is evidently too small a grate surface and imperfect draught. You should get an experienced engineer to superintend the reconstruction.

L. H. M., OF LA.—Chalk your belts on the pulley side. It will make them hold much better, and preserve them into the bargain. The use of water-glass on leather belting is, in our opinion, worse than useless, notwithstanding Prof. Joy's statement referred to.

L. F. G., OF VA.—Your bluing preparation is patentable and will sell. Large profits have been made in this class of inventions.

H. S., OF MASS.—There is no end to improvements in washing machines. Judging from the number of patents issued upon them, some people must find them profitable inventions. We decline to give an opinion upon yours in the absence of a model, or a more clear description than you forward.

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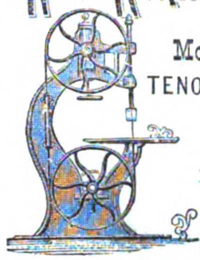

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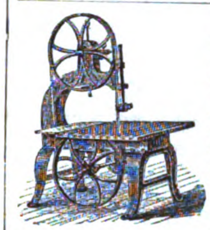

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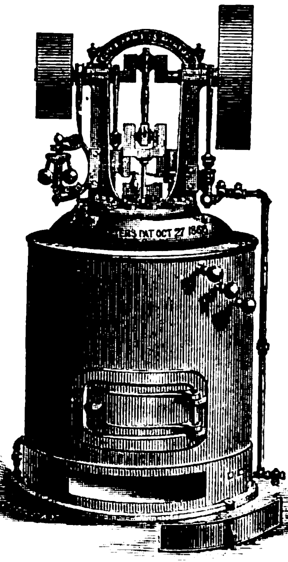

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None but ORIGINAL illustrations—preferably executed by *our own engravers*—will be published in the AMERICAN ARTISAN. Distant patentees desiring to have their inventions illustrated and described in our columns, should at once send us a small model of their machine, by express (prepaid); or mail a good photograph, together with their LETTERS-PATENT, to our address. We will then promptly examine the same, and return a reply, stating the precise expense of the engraving, the payment of which will be always required in *advance*. Address models, documents, etc., for the above object, as follows:—

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WHATEVER conduces to greater security in railway travel not only merits, but will receive, attention from the public. The penny-wise-pound-foolish policy of railway companies has too often prevented the adoption of such improvements, but any one who visits the great depots in this city and elsewhere will discover in the numerous advertisements displayed the evidence that competing lines have found it necessary to make safety appliances an inducement to secure passenger traffic.

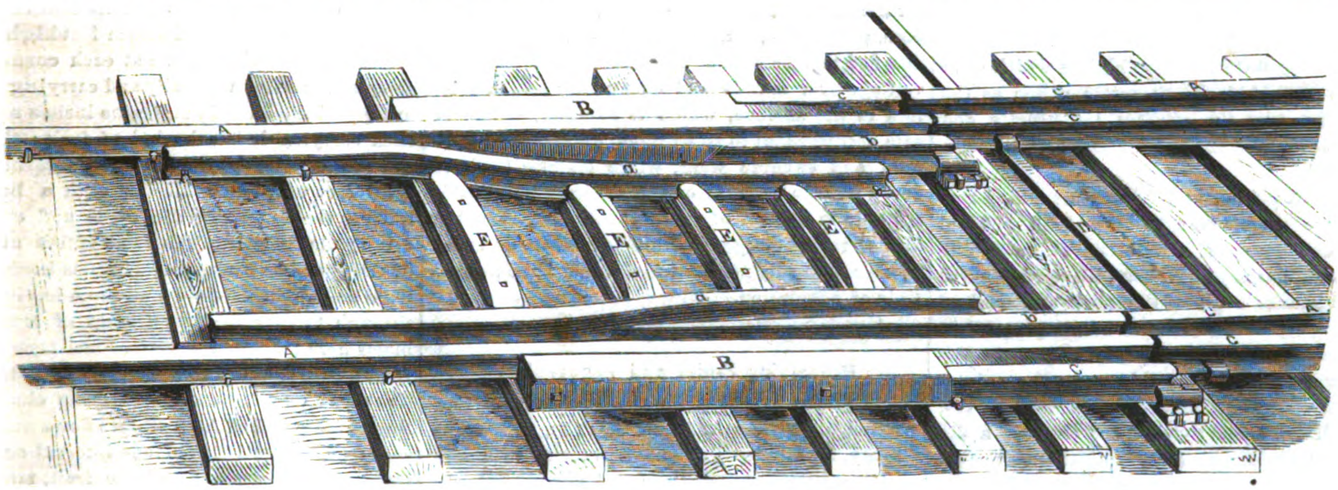
Our engraving illustrates such an appliance, a railway switch calculated to obviate the often sad results of carelessness on the part of switch-tenders.

In whatever position this switch is placed, it will conduct an engine or car either to the main or side track, by moving four rails instead of two, and by means of the safety rails, B, B, and guard rails, *a*, *a*. The safety rails are made very wide and inclined at one end, so that when the rails are in the position shown in the engraving, if an engine should approach the switch from the right-hand side on the rails, A, A, the flange of the wheels on the rail, A (the upper one in the engraving) will mount up the incline, C, and when the opposite wheel reached the guard-rail, *a*, it would guide both on the main track. If the switch was turned the opposite way, exactly the same result would be caused by the incline on the opposite side of the track.

A is the main track; C shows the movable rails, which are operated by the bar, D; *b*, pointed rails, spiked down solid to the ties; *a*, the guard-rails; F, pieces of wood spiked down to the ties, which hold the rails in position; B, the safety rails, which are made of hard wood and plated with heavy iron on their upper and under surfaces. They have a gradual taper at the end toward the movable rails, to allow the flanges of the wheels to roll up on top of B, and across A.

An ordinary cast-iron chair is used for this switch, and is the only cast-iron used in its construction. The safety-rails are all spiked to the ties, independent of each other, and do not form any part of the main track, and it is claimed that for this reason they are not subjected to constant wear from passing trains, and are therefore less liable to get out of order than they are on other safety switches.

The switch has been put in operation on the New York Central Railroad, near the junction of the Northern Central at Canandaigua, where it can be seen. Further information can be obtained from the Cooke Safety Switch Company, Canandaigua, N. Y.



COOKE'S SAFETY SWITCH.

Effects of Faults in Vision on Painting.

DR. R. LIEBREICH recently delivered a lecture on this subject at the London Institution. The following is an outline of it:—

On one occasion, when visiting the National Gallery, Dr. Liebreich was struck with the difference between Turner's earlier and later paintings. The cause of this did not clearly appear from Turner's life, though during the last five years of it the painter's vision and intellect were known to have suffered, for the changes had first appeared fifteen years before that. Dr. Liebreich was therefore led to seek for the cause in a scientific study of his paintings. The prominent feature in this change consists of a vertical *streakiness*; each luminous point is changed into a vertical line. In his earlier works the sun, *e.g.*, has a clearly defined disk, the light radiating equally to all parts; in his later, a vertical yellow streak divides it into two distinct halves. So with less luminous objects—houses standing near water, or figures in a boat, are made to blend with their reflection, and all becomes a conglomeration of vertical lines, while all tracing of detail vanishes under such lines.

The first appearance of change is in 1831, consisting of an increased intensity of diffused light from illuminated parts. From 1833 this diffusion begins to get vertical, and the tendency increases in the following years.

Now, it is commonly supposed that Turner adopted a peculiar manner, and exaggerated it more and more. The fact appears to be that his change of manner arose from a change in his eyes, and that he reproduced scenes as he saw them.

As age advances, the crystalline lens of the eye (at no time perfectly transparent) gets dimmer and disperses the light more strongly, throwing a haze over illuminated objects. In Turner's case, a clearly-defined opacity was formed in the dimness of the lens, and had the effect of dispersing the light vertically. This increased till not only the aspect of nature was altered, but he could not see his own pictures correctly.

While these later paintings have many merits, it is yet a mistaken notion which leads people to admire the defects referred to, and call them Turner's style, from which they would form a new school.

Dr. Liebreich illustrated some of the above effects by experiment. Projecting a picture of Venice, distinct in its outlines, on a screen, he then interposed a lens, which gave the picture the streaked appearance of Turner's later paintings. A picture of a tree was also thus altered into one of "Turner's trees," which, the lecturer said, were entirely unlike anything in nature, and unknown to botanists.

Turning to another class of cases, we find irregularities of refraction in the eye affect an artist's work. To see an object distinctly, its image must fall on the retina. But to effect this, the eye must accommodate itself to the different distances of the objects seen. It does so by changing the form of the crystalline lens. For the nearest point, the lens is at its greatest tension; for the furthest, in

complete repose. This latter state of the eye constitutes its refraction. There are three different kinds of refraction. 1. That of the normal eye, in which rays parallel, or from an infinite distance, unite on the retina. 2. That of the short-sighted eye, in which they unite in front of the retina. 3. That of the oversighted eye, in which they unite behind the retina. In the second case, when looking at the distant objects, concave glasses are used to make the rays *diverge* on approaching the eye; in the third case, convex glasses are used to make the rays *converge*.

Now, it may occur that an eye is normal in one direction and short-sighted in another. Conceive the eye as a globe with one pole in front, and two meridians on the surface at right angles to each other. If these meridians have different curvatures, we have a difference of refractive power in the two directions. This constitutes astigmatism. The effects of this, in artists, vary with the particular kind of it, and with the subject painted. Thus Dr. Liebreich knew a landscape painter and a portrait painter who had the same kind of astigmatism, their sight being normal for vertical lines, while they were slightly short-sighted for horizontal lines. In the landscapes, there was no disturbing influence in the distant parts, where sharp outlines were not requisite, but rather undefined and blending tone of color. The foreground represented water with gently moving waves, and Dr. Liebreich noticed some short horizontal strokes of different colors that did not seem to belong to the water. Using a glass which gave him the same kind of astigmatic vision as the painter's, he saw the strokes indistinctly and mixed together, and the effect became quite natural and good.

The portrait painter had at one time a high reputation, though some thought his portraits showed too great indistinctness in details. This was due really to astigmatism. Latterly, his portraits had become very much worse, the neck and oval of the face being elongated out of all proportion, and all the details distorted. The effects of astigmatism were doubled in this way; the painter having become far-sighted for vertical lines (for which he had a normal vision before), sees a distant person at whom he looks elongated vertically. The picture being near, is seen enlarged horizontally, and thus he paints the person even more elongated than as the latter is seen.

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A MATERIAL that is capable of being pressed into any variety of form, in a heated and semi-fluid state; that admits of all varieties and shades of color, either veined or in body; and that presents a smooth, homogeneous, and impermeable surface, indestructible under atmospheric influences or exposure, must be admitted to be most admirably suited for all purposes of decoration, and to secure ease of manipulation with permanency and effective appearance. When to these advantages is superadded the essential qualification of economy, whether from the point of view of first cost or of maintenance and repairs, it will be felt that the subject of this notice—which is claimed to realize all these and more—will command a wide field of practical application and use, supply a great want, and establish for itself a high and permanent position among the appliances of building and construction.

The *Mechanics' Magazine* describes a vitrified marble, of which Mr. Jesse Rust is the inventor and patentee, which it states is a material that lends itself most happily and effectively to agreeable and durable ornamentation.

The material itself results from the admixture and melting together in a furnace of equal parts of certain vitreous and silicious substances, in about equal proportions, to which are added, at a suitable stage, and in the requisite quantities, such coloring materials as will produce the desired effects, either as a plain body-color equally diffused throughout the mass, or in veins of one or more colors with or without ground. When in a semi-fluid state, while yet hot, small or large masses of this plastic matter are cut off and pressed into iron or steel molds carefully formed to the desired shape. In this manner decorative objects of any size, shape, or appearance can be produced with the utmost facility and rapidity of execution.

The manner in which natural materials of all kinds can be imitatively reproduced is extraordidary; ordinary marbles, veined and other, porphyry and malachite, jade, lapis lazuli, etc., thus prepared are, if anything, more real than the genuine objects themselves, and have the advantage of being in forms that could only be obtained out of the originals with great labor, waste, and cost. They can also be obtained and applied in bulk and solid masses, as for vases, paper weights, inkstands, table-tops, etc., or in minuter portions, such as pateræ and tesseræ, or amorphous pieces for mosaic work in every variety, suitable for dadoes, pavements, etc. For the latter purpose the vitrified marble paving possesses an important advantage over marble and encaustic tiles, in relation to the surface, which is rougher, and more safe and pleasant to tread upon, giving good foothold and equable wear, while lending itself to every pattern, regular or the reverse. And it is not only in respect of mere surface patterns, but also of raised designs and molded forms of every species, that this material is claimed to be susceptible of adaptation.

Preserving Fruits and Vegetables.

IN an essay prepared for the Agricultural Convention at Savannah, by B. H. True, of Morgan County, he alludes in flattering terms to a new system of preserving fruits and vegetables—the invention of Mr. Charles Alden—which he considers of vast importance to the people of the South. This new process has received high recommendations from eminent chemists, and a good share of the Government contracts for the army and navy are now awarded to establishments preserving fruits and vegetables in this way. Dr. Hall's Arctic expedition was fitted out with a three years' supply of fruits and vegetables.

Mr. True gives the following description of the process:—It is well known that the starch and sugar of fruits are almost identical in their chemical constitution, and that starch develops into sugar by the aid of acid, both in natural ripening of plants and in such artificial processes as the conversion of potato starch into grape sugar by the aid (but not consumption) of sulphuric acid, which is prosecuted on a commercial scale in Germany. The conversion of the grape into the richly saccharine raisin is a familiar instance, to which many others might be added by the super maturation of fruit by semi-artificial means, after reaching its full natural maturity in connection with the plant. But to Mr. Alden belongs the honor of the discovery that the process of super-maturation can be artificially stimulated, so as to convert the mucous constituents of any organic product largely into saccharine matter, in a very few hours, with a result analogous to the "raising" of the grape. In other words, this wonderfully enriching change which crude art can only effect in certain specially adapted products, such as the grape, fig, and prune, and that under certain precise climatic conditions, is now found practicable by scientific but simple apparatus, with any organic product containing amylaceous matter, and in any part of the world. The apple, peach, or tomato, for instance, can be as truly "raisined," according to its kind, as the grape; and it is not unreasonable to infer that, by the same scientific aid, the "raising" of the grape, fig, and prune, etc., may be dispatched with like celerity, and proportional improvement of the product in point of both richness and freshness, especially the latter.

For it must be understood that the peculiarity of the Alden preserved fruits or vegetables is wholly or mainly in their enhanced sweetness and refinement. This change, by itself considered, as illustrated by the dried grape or raisin, is but an incident to something far more important, novel, and startling. Dried fruit in its best estate may be described as the opposite of fresh. The Alden fruit, on the contrary, is *fresh fruit* (rendered imperishable), and, therefore, must not be confounded with dried fruit.

The chief mechanical parts of the apparatus are the evaporating or pneumatic chamber, ordinarily five feet square and fifteen feet high; the revolving endless chains, one at each corner of the chamber, running vertically and carrying brackets to support the fruit frames, nine inches apart, and each carrying half a bushel of fruit; the steam coil at the bottom of the chamber containing about 3,000 feet of pipe connected with a boiler, for heating the air-blasts; the boiler and engine for driving the blower. The fruit enters at the top of the chamber where the air blasts issue out in a tepid and slightly humid state from having passed through twenty to forty frames of fruit. The blasts here take off the surface moisture from the fruit quickly, but not so perfectly as to incrust it. At every nine minutes the carrying chains move the whole series of fruit frames downward on the chamber, by the depth of one interval or two, according to the moisture of the fruit, two frames at the bottom being taken out and two freshly filled being put in at the top. As the fruit descends the blast becomes gradually warmer and freer from humidity, until its highest temperature is found at the lowest interval, where it is from 160° to 175° Fahr. The cost of this machinery complete is $2,500. The following is a detailed statement of what is claimed to be accomplished with one of these machines in a week's time, at work on peaches. One evaporator of 40 frames, carrying half bushels per frame, two frames entering and coming out every nine minutes, makes 160 frames, or 80 bushels in 12 hours. Total, say, 500 bushels per week, with the following result:—

Five hundred bushels per week yield 4,000 pounds fruit, averaging in New York 30 cents	$1,300
Seven hundred and fifty pounds skins, worth for jelly and marmalade 6 cents per pound	45 00
Total	$1,345

COST.

Five hundred bushels at 50 cents	$250
Total cost for fuel, engineer, girls to pare peaches, etc.	163
Whole expenses	$413
Net profit per week	[illegible]32

Mention is made of the delicious sirup obtained from the hydrated sweet potato, at a trifling expense, by Mr. Alden's patent exhausting process. The yield is over one gallon. The average pro-

duct per acre is 500 bushels, yielding, at only one dollar per gallon, $500 in sirup, and a residuum of five thousand pounds of flour, worth at least $150. The cost of manufacture, without paring, need not exceed the value of the flour, leaving the sirup $500 as the annual clear product of tillage per acre.

Mr. True says this sirup is pronounced by all who have tasted it the finest article ever yet known. The manufacture of the sugar is as yet undeveloped; but he predicts that in preserved sweet potatoes, sirup, and flour, to go no further, the Southern States will find at once a product and a market practically illimitable, which must, ere long, rival cotton itself in aggregate value, while greatly surpassing it in profit. The flour makes delicious griddle or batter cakes, puddings, pies, and bread, and it is believed will yet become one of the most popular and important of breadstuffs.

Writing Machine for the Blind.

At a recent meeting of the Royal Scottish Society of Arts a communication was read from Mr. Robert Meldrum, teacher of the blind, Alloa, describing an improved method of corresponding between blind persons. The invention consists of two parts—the upper having the types, with keys and levers for moving them, and the lower containing the paper-moving apparatus. The base of the upper part is a metal disk, with a circular hole in the center. Around the central opening are arranged twenty-six little hammers, having on their striking surface copper types for embossing the paper. The types are so arranged that they all strike at the same place—viz., on the opening in the disk, and each hammer, after striking, is pulled back to its original position by an india-rubber band. Each of the keys represents a letter, and when any particular key is pressed down the corresponding hammer strikes, and the type makes a mark on the paper, which is stretched on a revolving drum in a drawer, below the disk. When one letter is impressed, the drum is moved round by a handle in front of the machine, and a plain surface is presented for the next stroke. When a line is finished, the drawer in which the paper moves is pulled out one line. The machine is constructed to print Moon's type, but its principle is equally applicable to most others, and especially to Braile's. After the paper had been read, the machine was exhibited in operation, and worked very satisfactorily.

The Great Fires of 1871 in the Northwest.

Prof. I. A. Lapham, Assistant to Chief Signal Officer U. S. A., contributes to the *Journal of the Franklin Institute* an article under the above title, of which the following is a condensation:—

The great fires that recently spread with such disastrous results over our whole northern frontier, from the Rocky Mountains to Central New York and Pennsylvania, must be regarded as the effect of meteorological causes. Unusual dryness pervaded the atmosphere, the amount of rainfall was very considerably less than the average, and the amount of evaporation considerably more.

Winds from a southwesterly direction, blowing often with great force and for several days continuously, bring to the great prairie region of the West this excessive dryness. The soil becomes desiccated to a considerable depth. Pine-lumber, of which houses, barns, etc., are made, becomes excessively inflammable. The weeds and grass of the prairies and stacks of hay and grain are deprived of all moisture, and partake of the nature of tinder.

When these winds are blowing, a small spark is sufficient to kindle a great fire; the camp fire, the wad from a gun, a spark from a locomotive, even the remnant of a cigar or the ashes from a pipe, may start a fire that will spread over a county. A stroke of lightning has, doubtless, been the origin of many a prairie fire. The Indians are said to have purposely set them on fire to rout the deer and other game.

The violent wind hastens to spread the flame over a constantly widening space, until large districts are laid waste by the "destroying element." It is familiarly known that these fires have annually spread over the great prairie region to the Mississippi Valley since their first exploration. Prairie fires are no new thing. Of course, they vary in extent from year to year, according to the varying dryness of the seasons and other meteorological causes. A smoky atmosphere in autumn has been the common experience every year; and this smokiness has its origin in prairie fires at the West.

The fire once started in the dry grass and weeds of the prairie cannot be extinguished; it must take its own course, gradually widening as it moves forward, until it presents a front of a hundred miles or more; and the flames, often reaching a great height, are blown forward, setting fire to places many rods ahead.

These fires do not kill the roots of the prairie grass, which springs up fresh from the blackened soil when its proper season returns; but the germs of other plants, including all forest trees, are destroyed.

When these fires reach the borders of the forest region, the trees are attacked and many of them destroyed; others are more or less injured. The young shoots are killed; the roots beneath the soil, and in many cases even the soil itself is consumed.

It is when the southwest wind is high, and the atmosphere dry, and when, from long absence of rain, the vegetation is also dry, that we are to look for these great prairie fires.

We thus have before us the true theory of the origin of the prairies; they are clearly due to the dryness of the climate in autumn and the consequent fires. Their existence is not due to the effect of dryness of climate upon the growth of trees themselves, for, when protected from fires, trees are found to flourish in the prairie region. It is by fire (induced by dryness) that the trees are destroyed or prevented from growing.

These conditions of climate, the autumnal dryness, and the prevalence of southwest winds, have existed for ages, and hence the normal condition of the great Western plains is that of prairie; and so long as these causes exist, this region must always remain in this condition, unless changed by ingenious and persistently applied devices of art.

The northern boundary of the region of prairie forms a line which varies from year to year as the seasons vary. A continued succession of dry seasons encourages great fires, that penetrate the forest border and extend the area of the prairie; while a similar succession of wet seasons may allow a growth of trees to spread far within the proper boundaries of the prairie. A constant struggle is thus maintained between the two conditions of forest and prairie, alternating within certain limits, and changing the position of the dividing line.

The work of extending the prairie border was exhibited in the autumn of 1871 upon the grandest scale. Fires spread more or less completely along the whole northern frontier, from the Rocky Mountains through Dakota, Minnesota, Wisconsin, and Michigan, and even into New York and Pennsylvania.

Within the past two or three decades this region has been occupied and "improved"; farms have been opened; mills built, especially throughout the "lumber region" or places where the stately white pine (*Pinus strobus*) predominates. Villages, large towns, and even great cities have sprung up along this prairie border line with a rapidity truly wonderful. And now it is found that these natural, ever-recurring meteorological causes which have for so many ages prevented the growth of forest trees, are equally operative in preventing the *building of houses, towns, and cities.*

Not only has the wild prairie region been swept by the fires of 1871, but thousands of square miles of forest have been destroyed. Many farms, with their houses, barns, stacks of hay and grain, miles of fences, etc., have been destroyed. At the same time, a number of towns and a large part of the city of Chicago were consumed, involving the loss of many thousand human lives. The ground upon which these improvements were made has been reduced to the normal condition of prairie.

It becomes apparent, then, that if we wish to occupy and improve this prairie region, to cover it with villages, towns, and cities, to cultivate its rich and productive soil, we must contend against this natural law, which constantly and surely tends to assert its power to reduce everything to its former normal condition. To do this will require more than individual effort—only united and enforced, or, in other words, governmental effort can afford hope of success.

The precautions necessary to resist this destruction of property are of the simplest kind, being only such as are necessary to prevent the occurrence and spread of fire. This involves not only watchfulness, but the disuse, as far as possible, of all combustible materials. The watchfulness should extend not only to our own premises, but to prevent the carelessness and criminality of others; which can only be done by public authority. The use of kerosene in all its forms should be prohibited; no locomotive should be allowed to move without adequate means to prevent the emission of sparks from the smoke-stack, and no fences of wood should be built. If the farmers of France, Germany, etc., can do without fences, certainly we can do the same, and thus save not only this food for the fires, but one-half of the aggregate capital required in the conduct of our agriculture! A thousand other measures, needless here to mention, should be adopted and *enforced*, looking to the same end.

It is announced that some farmers who have "lost their all" by these fires have become disheartened and discouraged, and will entirely abandon their possessions. If this is done now, while everything is fresh and new, while the soil retains its virgin richness, what may we expect in after-years? Gradually, but surely, the whole country will be reduced (as have been the once fertile plains of the East), to the condition of a desert. It is true, this may be in the distant future, but it is nevertheless our duty to prevent this result, so far as it is within our power.

If fences could be dispensed with, and if our houses could be constructed of materials other

than wood, the very great destruction of our forests, now going on with such fearful rapidity, would be checked. It is estimated that fifty years will suffice to consume the pine lumber of Wisconsin and Michigan, the prominent sources of supply; the time therefore is close at hand when the forests will no longer supply the lumber used in temporary construction, erected only to increase the danger of great public calamities by fire!

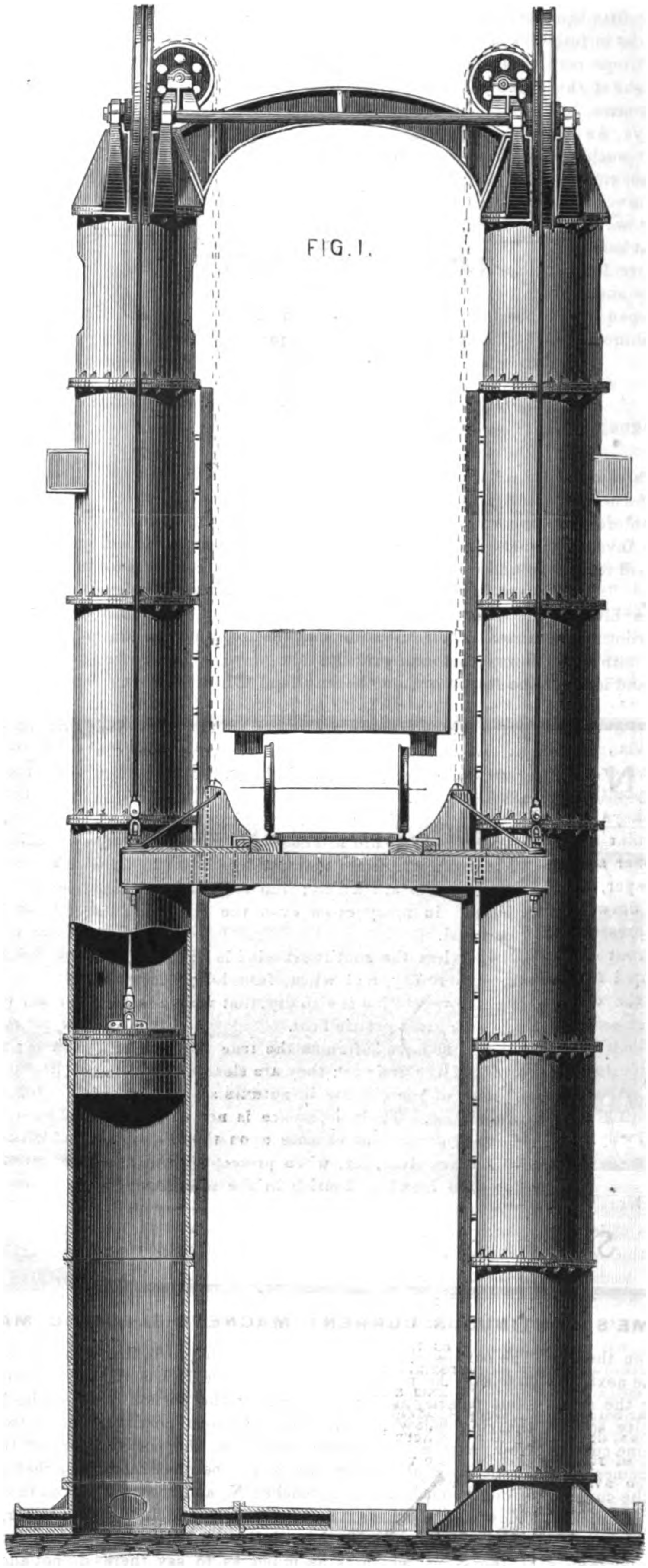
Should the present policy be continued, the destruction of a large share of the newly built railroad stations in the prairie region of the West will surely come; they are built in opposition to the law of the land—a law that sooner or later must be enforced. A dry season, a strong wind, and an accidental fire, whenever they occur together, will do the work.

If these views be correct, it is apparent that the precautions against these great calamities are most needed at the southwest part of the town or city; here is always the place of greatest safety, and here should be erected buildings for the preservation of the precious records and works of art, which, if lost, cannot be restored. Had the fire of Chicago originated at the north or east side of the city, the barn in which the kerosene lamp was kicked over alone would have been burned.

Gjers's Pneumatic Elevator.

We give herewith engravings illustrating a pneumatic elevator used at the Ayresome Iron-works, England, to raise the materials to the level of the top of the range of calcining kilns and store bunkers, this hoist being situated at one end of the range, while at the other there is a pneumatic drop by which the empty wagons are lowered.

The elevator, which is of a type designed by Mr. Gjers, and successfully introduced by him several years ago—consists of a pair of cast-iron cylinders placed sufficiently far apart for the platform on which the wagons are carried to rise and fall between them. Each cylinder is 48 inches in diameter, and is made in lengths of 8 feet each, bolted together by flanges as shown, each length being recessed at one end to receive a corresponding projecting rib formed on the face of the next length. The two cylinders are 14 feet 9 inches apart from center to center, and at the top they are connected by a cast-iron arched girder, which ties them firmly together. Each cylinder also carries at the top a pair of short cast-iron girders or caps, which serve to support the plummer blocks for the axes of the pulleys around which pass the ropes connecting the platform with the pistons of the pneumatic cylinders. These pulleys are each 8 feet in diameter by 9 inches broad on the face, and they are made with wrought-iron arms and cast-iron rims and bosses. The two corresponding pulleys belonging to the two cylinders are keyed on the same shaft, this shaft being about 5 inches in diameter, and as the wire ropes from the corners of the table are made to lap once round the pulleys, the pistons in the two cylinders are compelled to move together, and the table is kept horizontal whilst rising and falling. The shafts of the two pairs of pulleys are situated 9 feet apart from center to center, and there is sufficient room between each pair of pulleys for a safety chain, which is attached to the piston, carried over a pulley 2 feet 9 inches in diameter, as shown in the front elevation, and thence down to the table. Under ordinary circumstances, however, these safety chains are free from strain, and they are merely provided to act in the event of the breakage of a rope.



GJERS'S PNEUMATIC ELEVATOR.

The platform consists of a couple of transverse timber beams, 15 feet 4 inches long, 14 inches deep by 12 inches thick, to the ends of which the wire ropes already mentioned are attached, these beams being connected by suitable timber framing and by the longitudinal beams on which the rails are fixed. The length of rails carried by the platform is 20 feet. To the framing of the platform are bolted a pair of cast-iron brackets, which work against timber guides, fixed to the cylinders as shown. These brackets also form the points of attachment for the safety chains, and from the tops of them truss-rods pass diagonally to the ends of the transverse timber beams already mentioned, as shown in the engraving.

The pistons are of cast-iron, and are packed with double cupped leathers, ready access to the packing being obtained through openings formed in the sides of the upper lengths of the pneumatic cylinders, these lengths not being traversed by the pistons during the regular working of the hoist. The lift is worked by alternately creating in the cylinders a plenum, or a partial vacuum below the pistons, according to whether the table has to be lowered or raised. In ordinary working the loads to be taken up vary from 15 to 16 tuns, and the balance is such that with this load an exhaustion equal to about 6 pounds per square inch is required to lift the table, while a plenum of about 4 pounds per square inch is required to bring the table down.

The hoist is worked by a pair of engines having the cylinders inclined at an angle of 45°, the two connecting-rods being coupled to a single crank at the center of a crank-shaft, which has at its ends a pair of opposite overhung cranks driving a couple of single-acting air pumps, both of which exhaust from one pipe, and deliver into another. These two pipes are connected to a casing fitted with a slide valve, the arrangement being such that by merely shifting this valve either the suction pipe can be placed in communication with the cylinders of the hoist, and the delivery pipe with the external air, or *vice versa*. The two cylinders of the hoist are placed in communication with each other by a pipe of rectangular section connecting their lower ends, this

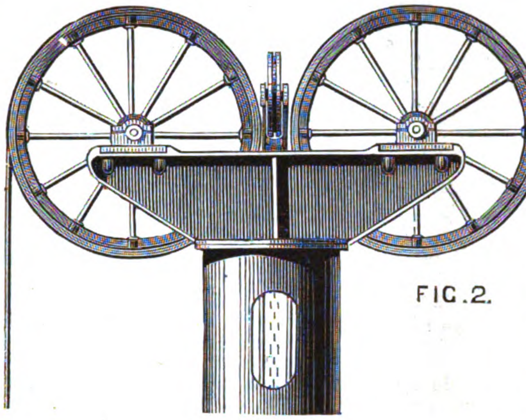
pipe measuring 6 inches by 12 inches inside, while from one of the cylinders a pipe leads off to the slide valve casing already mentioned.

The hoist we have been describing lifts the wagons 35 feet, and with the four furnaces in full work, it will have to raise at least 6,000 tons per week, this quantity being the gross weight of the material and trucks. At present, of course, it is raising but about half that quantity. As we have already stated, pneumatic hoists such as that we illustrate were introduced several years ago by Mr. Gjers, and they are now in use at a number of iron-works. They work very steadily, are controlled with great ease, and require a very moderate expenditure for maintenance, while their construction is such that the working parts are at all times open to inspection—an important point in machinery of this class.

Gramme's Continuous Current Magneto-electric Machine.

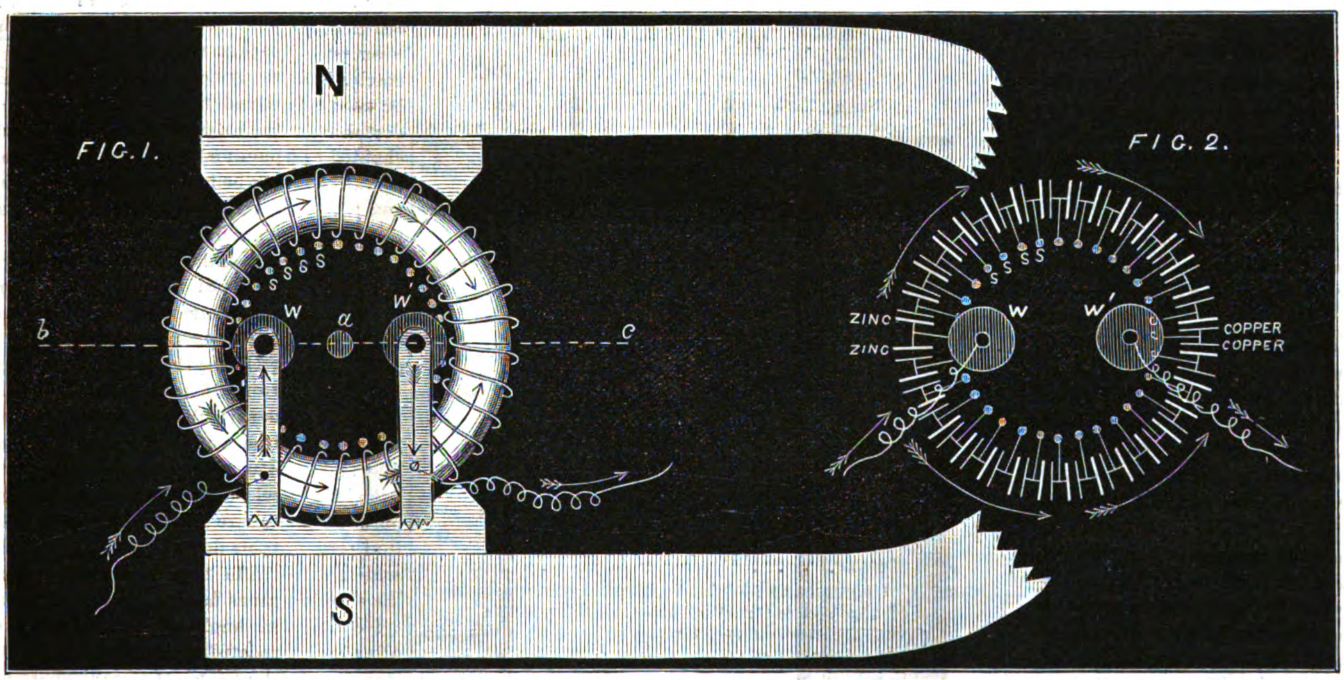
MR. ROBERT SABINE, C.E., communicates to the *Mechanics' Magazine* a description of a new electro-magnetic machine, which is so interesting that we have caused a diagram of the invention to be prepared illustrating the principle of its operation.

In all the magneto-electric machines hitherto constructed, only an approximation to a continuous current has been arrived at, and that either by making each machine a compound one, and having several armatures, arranged so that when the current ceased in one it was taken up by the next, and so on; or in other machines by driving the armature or amatures at a very high velocity, so that the interval between the cessation of one current and the commencement of the next becomes inappreciable. In M. Gramme's machine, the current, whether the machine be turned slowly or quickly, is continuous. Fig. 1 is a theoretical representation of this machine. It consists of a horse-shoe magnet, N S, between the poles of which turns an iron ring with an insulated wire wound round it in one continuous length. The inner bends of the turns of this wire are connected with small studs, *s s s s*, insulated from one another. The edge of the faces of two wheels, *w w'*, press against these studs as shown, so that, as the iron ring with the wire wound round it rotates, three or more of these studs are always in contact with them. In the actual machines, each of the turns as represented in the cut is really a separate coil of several turns of wire, the junctions between the ends of



one coil and the next being connected with the studs, and the iron ring is not necessarily one of round iron, bnt may be, or rather is, a short and very thick soft-iron tube, and the permanent magnet a proportionally broad compound one. The action of the machine may be explained as follows:—Let us regard the turn of wire just above the line, *b a c*, on the left-hand side of the ring. The portion of the iron ring above this turn, that is to say, the portion nearest the pole, N, has the same polarity as that pole, whilst the portion of the ring below the turn has southern polarity. Now, as the ring rotates about *a*, the portion of the ring above the line, *b a c*, becomes more strongly north as it approaches N, and the part below less south as it recedes from S, and finally, when it arrives at N, the polarity on both sides is the same, which is as much as to say there is no magnetism in it. This change causes a current of electricity to be induced in the wire. As the turn now moves on toward S, the iron in front becomes a south-pole, and that behind a north-pole, until it arrives at the line, *b a c*, when the difference of polarity is the greatest. This change sends another current through the wire which, as the turn has become turned over in position, will be in the same direction as the former one, or rather will be a continuation of the first current, so that the turn of wire in changing from *b* to *c* has a continuous current induced in it, as have in like manner all the turns before and after it. As now the turn moves further still, the magnetism becomes less and less, as at first, and finally, when at S, disappears, and on going still further becomes reversed as before; this causes a current to circulate through it in a reverse direction to the former one, and so also for all the turns before and after it; these currents together pass out through the studs, in contact with the wheel, *w*, and return when the circuit between the two wheels is completed (as they must be of course before any current can flow) through the wheel, *w'*, and thus a continuous current is kept up as long as the wheel is kept rotating. The circuits of the machine are precisely similar to two sets of cells joined up for quantity, that is to say, the last zinc plate of one set joined to the last zinc of the other set, and also the last coppers joined together, as shown in Fig. 2, each cell representing one turn, or in the actual machine one separate coil.

As each wheel always presses against three or more studs, the coils between these studs are short circuited, and do not add their power to the others. The resistance of the wire in the machine will be the resistance of the length of wire between the stud pressing against the higher part of the wheel, *w*, and the stud pressing against the higher part of the wheel, *w'*, taken parallel with the length of wire between the studs pressing against the lower part of the wheels, which is equivalent to rather less than a quarter of the resistance of all the wire taken in one length. The resistance is not exactly a quarter, because the coils between the studs pressing on the wheels are in a short circuit, and do not add their resistance to the other wire. By constructing the coils of thick wire, a current of great quantity can be obtained, or with a larger length of thin wire, one of great intensity. The electro-motive force of the current is directly proportional to the rate of rotation of the coils—that



GRAMME'S CONTINUOUS CURRENT MAGNETO-ELECTRIC MACHINE.

is, when the rotation is not extremely rapid, for the demagnetization of the iron requires a certain time. The machine, from its great simplicity, is likely to have an extended use for such purposes as electrotyping, the electric light, etc.

High and Low Chemists—Acetate of Lime.

BY CHARLES A. SEELY.

[From the *American Chemist*.]

IN England, as appears from recent issues of the *Chemical News*, there are chemists who, in their reports on commercial articles, systematically exaggerate values, while another set are persistent depreciators; the truth of the analyses of these gentlemen is to be found only by interpolating the + or — coefficient of variation, or by calculating the just mean of the conflicting figures. Sellers naturally affiliate with the high chemists, and buyers are safe only in the hands of the low. There are chemists who are bulls and others who are bears. I don't know but such exist here; when our profession gets to be larger, they will no doubt become fully developed.

I have recently had some interesting and instructive experience with a few English high chemists, which seems to me too valuable to the profession to be withheld for private use. The story is also worth telling for the humor of the naked facts.

Last summer, my report on a sample of crude acetate of lime was objected to. The article came from England, and the "test note" of an English chemist asserted a value of more than fifteen per cent. above that of my report. The difference of the analyses implied a difference of valuation of the cargo of about $2,000. I insisted on the accuracy of my report; the estimation of acetate of lime was a simple process, and had been often executed at my laboratory; a difference of fifteen per cent. in two determinations of fair samples was preposterous, etc. Thereupon began a controversy between the shippers and the consignees, which, judging from the letter appended, marked B, was not kept very strictly within the limits of temperateness and courtesy. Early in January, the consignees requested me to furnish a description of the process adopted by me, and I responded by the letter marked A. This letter was sent to the shippers, and is the document referred to by them and the high chemists as rubbish, etc. The appended letters constitute a sufficient *éclaircissement* and *dénouement* of my story, to analytical chemists who are familiar with the determination of crude acetate of lime. For others a brief explanation is necessary.

I lay no claim to the invention of what is spoken of in the letters as "Seely's process." It was published in Fresenius's *Zeitschrift*, in 1866, and later in Storer's "Cyclopedia of Chemical Analysis." It is adopted by some of our most accomplished analysts, and is without doubt the most accurate and convenient method of determining the acetic acid of crude acetate of lime. If the hydrochloric acid be determined volumetrically by nitrate of silver (in this case neutralize the mixed acids with carbonate of lime), the process requires but one weighing and no filtration. The range of error ought not to exceed 2 per cent., and I am assured by Mr. C. M. Stillwell, who has made a special study of the process, and who is one of our most reliable authorities, that it need not exceed ·02 per cent.

The high chemists, it will be seen, determine soluble lime, and upon that calculate acetate of lime, while others determine acetic acid, and calculate on that basis. As the commercial and intrinsic value of acetate of lime depends solely upon the acetic acid, and as this acid is never in excess of the lime, the determination of the acetic acid is absolutely conclusive of the amount of the acetate of lime. The lime may be regarded simply as a convenient vehicle of the acid. But the soluble lime is an excess of what is demanded by the acetic acid. If this excess were constant, or if the soluble lime had any constant ratio with the acetic acid, the English high process might furnish some fair clue to an approximation of the truth. But unfortunately the amount of soluble lime is quite too independent of the acetic acid. The high chemists may be pretty sure that their figures are from ten to twenty per cent. above the truth, and perhaps that degree of acurarcy is considered sufficient for the American market. But the point is made more apparent by the figures of a few careful analyses of crude acetate of lime; and here they are:

	a	b	c
By the high process,	85·60	85·2	83·5
By the H Cl process,	76·63	59·2	62·5

I now present the documents.

A. Seely's letter.
B. Shippers' letter to Consignees.
C. 1st High Chemist's letter.
D. 2d " " "

A.

26 PINE STREET, NEW YORK, Jan. 6, 1872.

MESSRS. . . .

GENTLEMEN:—The process of testing acetate of lime used in my laboratory, consists in acting on the sample with an excess of hydrochloric acid and distilling. The hydrochloric acid is used in two or three portions, a distillation following each addition of hydrochloric acid. The total acidity is determined in the mixed distillates, and the hydrochloric acid in the distillate is determined and deducted from the total, leaving a difference, being the acetic acid. The process has given such constant and satisfactory results, that I can have no sufficient reason to doubt the accuracy of the tests I have made for you. I am exceedingly desirous to know the explanation of the discrepancy between my reports and those of the English chemists, and I submit the above description of my process in the hope that it may furnish some clue to it.

I remain, very respectfully yours, etc.,

CHARLES A. SEELY.

B.

GLASGOW, Jan. 27, 1872.

MESSRS. . . . New York.

SEELEY'S PROCESS ACETATE OF LIME.

DEAR SIRS:—We have carefully examined this person's communications to you, and a more unmitigated piece of rubbish we have never read as put forth by a professional (*sic*) man. We have so frequently written about the absurd nature of these New York analyses, that we felt to go over the ground again and by ourselves would not improve your position. We therefore submitted the Seely process to Messrs. . . . London, the celebrated analytical chemists, and we hand the original reply as received by us yesterday. We also hand report from Professor ——, and upon the same process. To comment upon these reports is unnecessary, and our only regret is that we were not favored with the process ere this, as we would have saved the losses made through your buyers giving this gentleman as an authority.

We are, yours truly, ...

C.

LONDON, Jan. 25, 1872.

MESSRS. . . .

GENTLEMEN:—We are in receipt of your favor of the 23d inst. We have read over the paper you inclosed describing the method used for analyzing acetate of lime in New York, but we think it would be waste of time discussing its details, as we agree with you that it is not worth the paper it is written on, or the ink in writing it, and, therefore, the results of any analysis returned by this method are worthless. Our method of estimating the acetate closely resembles yours. We weigh out a given weight of the sample, dissolve it hot water, cool, and make up to a given volume, mix, and then take a given volume of this solution, and precipitate the lime by the addition of ammonia and carbonate of ammonia, weighing the resulting carbonate. We always make two determinations of every sample, and the results never differ. Carbonate of ammonia is better than carbonate of soda, as carbonate of lime is apt to carry down carbonate of soda in precipitating, thereby giving too high a result. Of course if any sulphur is present, its equivalent is subtracted from the carbonate of lime.

We are, gentlemen, yours truly, . . .

D.

GLASGOW, Jan. 27, 1872.

MESSRS. . . .

GENTLEMEN:—I have carefully examined the details of the process you handed to me yesterday, for the estimation of acetic acid in crude acetate of lime, which is said to be in use by a New York chemist. I have no hesitation in saying that the method is not only useless, but misleading, and that it is quite inapplicable to the analysis of commercial acetate of lime. The method I have long followed is to boil a known weight of the acetate in solution with a weighed quantity of carbonate of soda (pure), filter, and determine the excess of alkali, by standard sulphuric acid. As a check upon this result, the precipitated carbonate of lime is ignited, redissolved in hydrochloric acid, and the lime determined by precipitation with oxalate of ammonia as usual. The fact that I have for many years employed this process in the analysis of acetates of lime for the leading manufacturers in this country, and that my estimations of acetic acid have invariably agreed with the yield obtained on the large scale, is a sufficient guarantee of its accuracy.

Yours faithfully, ...

The New Gas at the Grand Central Hotel, New York.

[From the *American Gaslight Journal*.]

IT is now just three months since we brought this subject to the general attention of the fraternity through our columns. At that time we believed ourselves justified, by reason of assurances received from *attachés* of the "New York Gaslight and Heat Co.," in announcing that exhaustive investigations of the alleged advantages of the new methods of manufacture would be at once instituted, the complete results of which would have been promptly put by us before the world. Obstacles have occurred, however, such as appear to be usually and inevitably incident to all new undertakings, and it is only in this issue that we are enabled to present a first installment of exact observations, obtained by dint of the determination and persistence of Wm. Wallace Goodwin, Esq., of the well-known firm of Harris, Brother & Co., of Cherry Street, Philadelphia. This gentleman, during a recent visit to California, was commissioned by parties there to look into this process, and a perusal of his report, as handed in by him, and printed (slightly abridged) on another page, will show how faithfully and energetically he has fulfilled the duty. Before proceeding to examine some of the points in Mr. Goodwin's report, let us first reaffirm that the more extended examination promised before is still in contemplation, and in point of fact is now, at the date of our issue, in actual progress; so that facts may be expected soon which will enable every competent man to form his own judgment in this momentous matter.

Now for Mr. Goodwin's results. These were obtained with coal furnished by himself, of a known staple quality, and precautions were taken, such as every reader of the report will concede to have been decisive, to prevent the possibility of any other material finding its way into the retorts or passing through the station meter, other than this Westmoreland coal, as weighed by himself, and its gaseous products. The general result he found was that, when the conditions were as favorable (in regard to back-pressure and other circumstances, as could doubtless be maintained constantly, with certain changes in the present construction of the holders), there was obtained 14,850 feet per long tun, or 6·63 feet per pound of gas which rated over 20 candles. There can be no hesitation in concluding, on the assumption of the absence of all deception or fallacy (which Mr.

Goodwin took such laborious pains to exclude), that no such amount of candle-power was ever approached to by any other method applied to this quality of coal. To get from a first quality of Westmoreland, by the ordinary methods of carbonization, 10,000 feet of 16 candle-power, is as much as we ever heard claimed by the most skillful management.

It is to be remembered that the increase of volume here is to be readily accounted for, from the fact that superheated steam, in other words *water-gas*, is made use of; but that there should be, together with the resulting increase of 48·5 per cent. in volume, a *simultaneous* increase of 25 per cent. in sperm value, over and above ordinary Westmoreland gas, is so stupendous that gas engineers will be highly excusable for any amount of incredulity and suspicion. Realizing this, Mr. Goodwin made use of a precaution, in making his observations on the station meter, which, while ingenious enough to deserve notice, appears as if it certainly ought to have led to the detection of any attempted fraud, such, for example, as the introduction of gas or vapor from any other source, before passing the meter. This consisted, as he explained it to us, and as exemplified in the tabular statement with which we close our extracts from his report, in observing the station meter at short irregular periods of time, noting the time and the status, from which he has reduced, in the last column of the table, uniformly the times corresponding to evolutions of 100 feet. It will be seen that these times increase, as they should, with a very satisfactory and consistent uniformity, which puts out of the question any "hocus pocus" in the way of surreptitious induction of gas from some hidden source. It is to be remarked that Mr. Goodwin's plan of observation, together with the object held in view by him, was kept locked in his own breast until his report was made. It may also be appropriate to add here that, in the further tests now in progress, certain further devices, having a like purpose, are to be employed, which will be wholly beyond the control of any but the experimenter himself, and which will furnish a criterion of the genuineness of the gas operated on, still more rigid, if possible, than the plan of Mr. Goodwin.

The Agassiz Expedition.

THE latest news received from the Hassler scientific expedition to the Southern seas is under date of March 18, and from off Sandy Point, Patagonia. Agassiz's glacial theory received final verification by the realization of his prediction, that in the Southern hemisphere there would be found traces of a glacial movement northward from the South Pole. He found near Mount Aymond erratic boulders polished, scratched, and grooved, all tending to prove the passage of a sheet of ice in a northward direction over this portion of the country. An important discovery was also made by Count Pourtales that many of the Patagonian mountains are extinct volcanoes, it having been hitherto claimed that none existed in the South American continent except on the line of the Andes.

Among the curiosities of science noted were immense quantities of kelp, or *macrocystic pyrifera*, the largest known alga, which grows about these coasts in from six to twenty fathoms of water in vast beds which warn the mariner to avoid the dangerous neighborhood. Its stems grow to be of immense length, having been estimated at from seven hundred to one thousand feet, thus probably constituting the most elongated of all organized beings, and dwarfing in comparison the redwood of California or the eucalyptus of Australia. One day in the open sea they passed patches of floating seaweed with large sea lions lying on them, apparently navigating in that manner with much satisfaction. They encountered a severe hail storm, in which the stones were nearly the size of ordinary English walnuts.

An interesting description is given of the guanaco animals, who form the chief means of subsistence of nine-tenths of the other animals of Patagonia, their flesh furnishing food for all the carnivora, human or otherwise, their skins being the chief article of barter, and their bones fertilizing the land. They belong to the same family as the camel and llama.

Improved Cabs.

THE Council of the Society of Arts (London) offer the following prizes:—One prize of £60 for the best improved cab of any description. Two prizes of £20 each for the next two best. Two prizes of £10 each for the next two best. The competing cabs must be exhibited at the International Exhibition, to be held in South Kensington in 1873, and have been in regular use in London for three months previously. They must be delivered on or before the first Saturday in April. The Council consider that the cabs now in use in London are especially defective in the following particulars:—1. Want of room, both as regards the four-wheelers as well as the Hansoms. 2. The seats in the four-wheelers are too high, not commodiously made, and the space underneath is lost. 3. Difficulty of getting in and out of the Hansom, by reason of the height of the step as well as the interference of the large wheels. 4. The arrangements for opening and closing the window in the Hansom. 5. The confined space and want of ventilation in the Hansom when the window is closed. 6. Imperfect locking of the wheels in four-wheelers. The Council point out that in Continental and some English towns there is to be found a very convenient class of open carriages, termed Victorias, as well as carriages opened or closed at the option. A model of a cab, to be used either closed or open, has been submitted, the principle of which might be adapted to existing four-wheelers, but neither this nor any special form is prescribed, leaving competitors to improve on existing forms and contrivances, or submit entirely novel forms and arrangements.

The New Metal Indium.

FROM a paper on this subject by the celebrated Prof. Odling, in the *Mechanics' Magazine* (London), we extract the following:—

In submitting to spectroscopic examinations a certain residue left by the distillation of some impure selenium, Mr. Crookes, early in 1861, recognized in the spectrum before him a brilliant green line, from which he inferred the presence in the above residue of a new element; and by the end of the same year he had succeeded in establishing the tolerably wide distribution of this element, to which he gave the name of thallium; in procuring it, though but in small quantity, in a separate state; and in satisfying himself of its metallic character. Soon afterwards, and without knowledge of Mr. Crookes's latter results, the metal was obtained by M. Lamy on a comparatively large scale, and was exhibited by him in the form of small ingots at the London Exhibition of 1862. He procured it from the fine dust met with in some oil-of-vitriol factories, as a deposit in the flues leading from the pyrites-burners to the lead-ed chambers. In these deposits, the minute proportion of thallium contained originally in the pyrites becomes concentrated, so as to form in some instances as much as eight per cent. by weight of the dust. Independently, moreover, of its occurrence in iron pyrites, thallium, though never forming more than a minute constituent of the different minerals and mineral waters in which it occurs, is now known to be capable of extraction from a great number and variety of sources. But from no other source is it so advantageously procurable as from the above-mentioned fine deposit; and so early as the autumn of 1863, at the meeting of the British Association in Newcastle, the then mayor, Mr. I. Lowthian Bell, exhibited several pounds, and Mr. Crookes no less than a quarter of a hundredweight of thallium obtained from this comparatively prolific source. In one respect the discovery of thallium presented even a greater degree of interest than attached to the discovery of cæsium and rubidium. For whereas these two elements were at once recognized as analogues of the well-known metal potassium, thallium can hardly be said, even at the present time, to be definitely and generally recognized by chemists as the analogue of any particular metal, or as a member of any particular family of elements. With each of such differently charactized elements as potassium, lead, aluminium, silver, and gold, it is associated by certain marked points of resemblance; while from each of them it is distinguished by equally well-marked points of difference. Hence the necessity for subjecting thallium and its salts to a thorough chemical examination, so as to accumulate a well-ascertained store of facts with regard to it. And thanks to the careful labors of many chemists, more particularly of Mr. Crookes in London, and of Messrs. Lamy and Willm in Paris, our knowledge of the properties of thallium and its salts may compare not unfavorably with our similar knowledge in relation to even the longest known of the metallic elements. Still, it was not until our knowledge of indium had culminated in the determination of its specific heat only last year, that the position of thallium as an analogue of indium, and member of the aluminium family of elements, became unmistakably evident.

Indium was first recognized in 1863, by Drs. Reich and Richter, in the zinc blende of Freiberg in Saxony, and by reason of the very characteristic spectrum afforded—consisting of two bright blue or indigo bands, the brightest of them somewhat more refrangible than the blue line of strontium, and the other of them somewhat less refrangible than the indigo line of potassium. Since its first discovery, indium has been recognized in one or two varieties of wolfram, as a not unfrequent constituent of zinc ores, and of the metal obtained therefrom, but always in a very minute proportion. Indeed, indium would appear to be an exceedingly rare element, far more rare than its immediate predecessors in period of discovery. Its chief source is metallic zinc—that of Freiberg, smelted from the ore in which indium was first discovered, containing very nearly half a part of indium per 1,000 parts of zinc. A considerable quantity of indium extracted from this zinc was exhibited in the Paris Exhibition of 1867.

PRESIDENT TILLMAN, of the Polytechnic Association of the American Institute, says the weather predictions which are daily published in our newspapers have been verified to about 75 per cent.; that is, three-fourths of all the predictions which they have made have been found to be true.

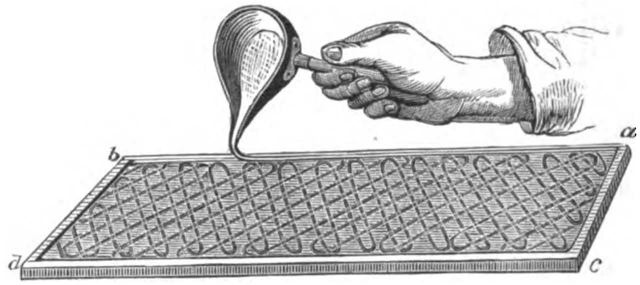
Improvement in the Manufacture of Confectionery.

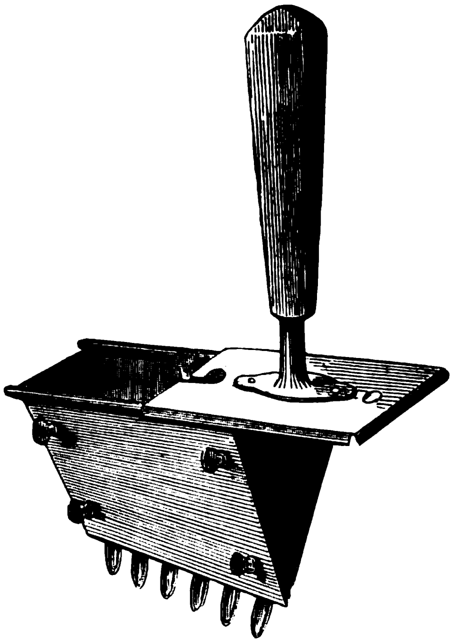
MONSIEUR A. E. C. LANDRY, cook to the Turksh Embassy, has recently patented in England and France an invention for improvements in the manufacture of sultanes and other similar articles of confectionery, and in the apparatus employed therefor, whereby the said articles are made in a much more rapid, perfect, and economical manner than at present.

To make the cylindrical parts of the sultane, or other similar article of confectionery, which has hitherto been attended with much difficulty and labor, Mr. Landry employs a flat mold, *a*, *b*, *c*, *d*, similar to that shown in the principal engraving; this mold is made of a suitable metal or alloy of metal, and is cast, or otherwise formed, with a raised lozenge pattern or design, the sides of the raised lozenge-shaped parts being slightly inclined; or the mold may be formed with any other desired design or pattern.

To make a sultane, the prepared sugar in a liquid state is poured into the sunken parts of the mold until a sufficient thickness is obtained, but so as not to run over or cover the raised parts of the mold. When sufficiently cool, but while yet in a plastic state, the sugar is rolled over a tin or copper cylinder, and the two ends joined by any of the means well known to confectioners. By this means M. Landry obtains, in a short time, and with but little labor, a hollow cylinder of sugar formed with openings, of the size and shape of the raised parts of the mold. The voluted or other ornamental parts of the sultane, such as the borders, etc., may also be formed by molds.

The second engraving shows a view of M. Landry's apparatus for forming hair sugar. It consists of a box or receiver, made of copper or tin, and provided with a sliding lid, to which is fixed the handle of the apparatus; the ends of the box are fixed to the sides by screws, as shown, so that the box may be easily taken to pieces for cleaning; in front of the strips or projections at the bottom of the box are slits for the passage of the sugar. To use this apparatus, the box is filled with sugar in a semi-liquid state, and, the apparatus being held in the position shown, the sugar will pass through the slits in the bottom of the box, and along projecting pieces, in thin streams or hair sugar, which may be guided according to the effect desired.





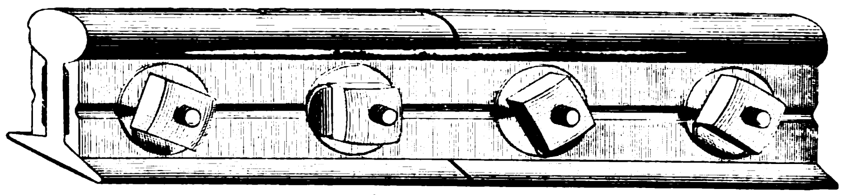
IMPROVEMENT IN THE MANUFACTURE OF CONFECTIONERY.

A PROMINENT gentleman in Lewiston, who is a native of Ireland, informs the editor of the *Journal*, that on a visit to that country nine years since he saw women carrying gravel in baskets strapped on their backs, for which each received $4 per month, or 16 cents per day, boarding themselves. One of the same women is now at work in one of the mills in Lewiston, earning some months $45, or $1 50 per day. It is the American system of protection to home industry that makes such compensation for labor possible in this country. And who would have American labor brought down to the European standard?

"AN alarm from Station 51, at 9·50 P.M., recently indicated fire at No. 212 Washington street, in a wholesale fruit-store. The lower insurance patrol were soon on the ground, and the fire was put out by them with the Babcock Fire Extinguisher."

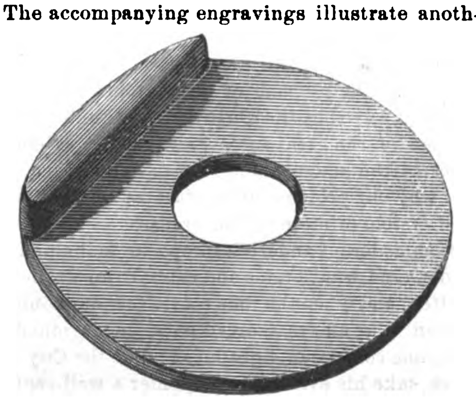
Gibbs's Lock Nut.

PROMINENT among the patents issued from the U. S. Patent Office for the last five years have been those relating to lock nuts. A great many devices of this kind have been produced, many of them possessing considerable merit, but still inventors are not deterred from further improvements, well knowing that the field is wide, and that a rich harvest awaits the most successful reaper



GIBBS'S LOCK NUT.

The accompanying engravings illustrate another new lock nut, patented through "The American Artisan Patent Agency," Jan. 4, 1872, by Pierre L. Gibbs, of Chicago, Ill. The invention is especially designed to secure the nuts of railway fish-plates.



Malleable washers each having a rib formed on its outer face are employed, the ribs on the washers abutting against the outer edges of the nut, so that the washer and nut turn together.

When the nuts have been screwed home, and the ribs of the washers engage the grooves in the nuts, the edges of the washers are tamped into grooves formed in the fish-plates. This prevents both washers and nuts from turning, holding them very firmly, while it admits of the ready removal of the nut, by the raising of the tamped edge of the washer. The effectiveness and simplicity of this arrangement will at once be recognized by practical railway men, and we entertain no doubt the invention will meet with the favor it merits.

Further information can be obtained from P. L. Gibbs, 109 Fifth Avenue, Chicago, Ill., or from John W. Quincy, 98 William Street, New York.

Gas Burners for Bending Glass Tubes.

THE *American Chemist* for January contains a note by Prof. J. Lawrence Smith, "On Bending Glass Tubes for Fitting Apparatus," in which he recommends a Bunsen burner flattened at its extremity so as to give a thin, broad flame. This is certainly a great improvement on the commonly employed burner, but an ordinary fishtail or batwing gas-burner will be found to give, if possible, still better results. Mr. H. Carrington Bolton now writes to that journal that he has employed for some years an ordinary batwing burner attached to a small, short stand (three inches high, burner included), so as to rest low upon the table, in order that raising the arms inconveniently high may be avoided. Such a burner insures a broad flame, by which the tube is heated for two or more inches in length; the tube is turned while in the flame, and removed for bending as usual.

The deposit of carbon which at first sight might seem an objection is really one of the chief advantages of using this burner. On placing the glass in the flame the deposit begins immediately, and prevents too rapid a rise of temperature and consequent cracking of the glass; during the heating the carbon tends to distribute the heat equally over the surface of the tube; and finally, on withdrawing the glass from the flame, too sudden cooling is prevented, and the glass is, as it were, annealed.

The black deposit is readily removed by a dry cloth. This plan was commonly employed in Hofmann's Laboratory, Berlin. In bending tubes of more than three-eighths of an inch in diameter one end should be closed tightly with a cork (or wax), and air blown into the other end at the moment of bending the tube; by regulating judiciously the pressure of the air upon the sides of the somewhat softened tube, the latter will neither bulge out nor collapse, but will retain its proper caliber. This cannot be effected, however, with very large tubes, or with very thin ones, which require the nice manipulation of the professional glass-blower.

THE inventor of a watch that winds itself up and gives a pint of milk a day has arrived in Washington to secure a patent.

AMERICAN ARTISAN

BROWN & ALLEN, Publishers,

ISSUED WEEKLY AT

No. 189 Broadway, New York.

H. T. BROWN. L. ALLEN.

AGENTS.

AMERICAN NEWS COMPANY, New York City; NEW YORK NEWS COMPANY, New York City; NEW ENGLAND NEWS COMPANY, Boston; A. WINCH & Co., Philadelphia; H. TAYLOR & Co., Baltimore.

WEDNESDAY, MAY 29, 1872.

CONTENTS OF THIS NUMBER.

[Illustrations are indicated by an asterisk.]

EXTRAORDINARY INDUCEMENTS.

THE publishers of the AMERICAN ARTISAN, to secure the aid of their subscribers in extending the circulation of this useful journal, offer the following EXTRAORDINARY INDUCEMENTS:

To every subscriber whose name appears in our subscription books, and who sends us a new name, with our regular subscription price inclosed, and twelve cents in postage stamps, we will mail free, and post-paid, one copy of Brown's FIVE HUNDRED AND SEVEN MECHANICAL MOVEMENTS, elegantly bound in cloth, and illustrated with 507 engravings. The retail price of this book, post-paid, is $1 12. A more liberal premium was never offered. This work has received the highest encomiums from the press, and during the short time since its first appearance has reached its ninth edition. A father wishing to place a work in the hands of his son that shall thoroughly initiate him into the mysteries of the elements of machinery, can find no work that will take the place of this able treatise. Each movement is illustrated by a clear engraving, accompanied with descriptive text, and it is by far the most complete collection of mechanical movements ever published. To the inventor it is an invaluable aid, and will save weeks of study and much needless expense in the search for what has already been discovered. We will also send, post-paid, to any one who remits us $4 12, two copies of the AMERICAN ARTISAN and one copy (post-paid) of the above-named work. To any one who sends us two subscriptions, with $4, we will mail a copy of the AMERICAN ARTISAN free for one year from date of receipt of remittance.

For more complete description of Brown's FIVE HUNDRED AND SEVEN MECHANICAL MOVEMENTS, and opinions of the press, see our advertising columns.

THANKS.

To notice specially each of the numerous flattering notices the present editor of the AMERICAN ARTISAN has received, and the kind and hopeful encouragement generously offered to him as he enters upon his new field of labor, would fill the remainder of this page. He trusts time will show that this fraternal courtesy is in some degree merited, and takes the present opportunity to express his grateful thanks for it.

RAPID TRANSIT FOR NEW YORK.

GOVERNOR HOFFMAN has signed the Vanderbilt Rapid Transit Bill, also that of the Swaine Three-tier Road, designed to run on the west side of the city through blocks from the Battery to the Harlem River. We should judge from the movements of Commodore Vanderbilt that he never entertained a doubt that the Governor would sign his bill, as he was already prepared to enter on the work as soon as he obtained the requisite authority to proceed. The Commodore's engineers have already surveyed the City Hall Park, and the building of the road will be pushed forward as fast as possible. Three years' time are given in the bill to construct the road, but Vanderbilt says he does not intend to leave the problem so long unsolved, but shall if possible complete the tunnel in two years. As to the prospects of the Swaine Three-tier, we have no satisfactory assurances that the work will progress, and it may have to drag its weary way along through tedious litigation. Property owners along the line of these elevated projects are not going quietly to submit to have their property cut up and its value impaired by them. The great viaduct scheme of Tweed, Sweeny, Hilton & Co. was a job so expensive and formidable that it proved too heavy even for them to carry, therefore it died of its own weight and corruption. The Greenwich Street stilted man-trap, having been once or twice seized and sold by the sheriff, is trying to coax the public to venture over its perilous ways, but its success is more than doubtful; in fact, no such structure ought ever to have been allowed in our great thoroughfares. This abomination, which has once, at least, been indicted by the Grand Jury, and declared a nuisance by the Board of Health, has taught our citizens a valuable lesson about elevated railroads. In our judgment, the problem of quick transit is best and quickest solved by the construction of tunnels; and, in view of the great success and rapidly extending lines of the underground road in London, we wonder why our people still hesitate as to what is the best system of metropolitan transit.

Commodore Vanderbilt proposes to help us to understand what brains and capital can do in this matter; and when the time comes that our doubting citizen who affects a dread to go underground till his time comes can light his cigar at the City Hall Park, take his evening paper, enter a well-ventilated, well-lighted car, and in ten minutes find himself at the Great Central Union Depot in Forty-second Street—with no inconvenience, no dust, no asphyxia, and everything nice and comfortable—he will be surprised at his own former credulity, and wonder why the underground project was so long delayed.

In this connection we cannot refrain from expressing the conviction that great injustice has been done to the Beach Pneumatic Tunnel Co. Mr. A. E. Beach, the projector of this scheme, was almost the pioneer in the movement to establish underground transit in this city. It is true his original charter only contemplated a package transit; still, he early saw this defect in his original plan, and made application to the Legislature to amend so as to allow him to carry passengers. Twice did the Legislature sanction this application, but Governor Hoffman seems to have either been perverse in his judgment, or he was blinded by prejudice against the Beach project. It has failed to become a law; and, although it is not unlikely that efforts may be made to revive the project, yet from present appearances Commodore Vanderbilt has the inside track as usual, and, having brains, capital, and energy to back him, will doubtless by this experience be able to gain an underground foothold which will give him great advantages over all rival projects.

We congratulate our citizens upon the probable early completion of one line of quick transit.

THE STRIKES IN THE BUILDING TRADES.

As predicted last fall, the building trades have organized and brought into operation the strikes of May. When these strikes were threatened months ago, many thought them idle menaces to compel higher wages. The writer, however, saw their true import, and in an article penned at the time expressed the belief that they would result in the concessions demanded by the strikers. How well founded was that belief remains for events to show.

Have these trades or any trades the right to insist upon reduction of the hours of labor, or increase of wages? The ARTISAN answers that there is no more doubt of the existence of this right than of the right to remove from a place where the labor market is glutted to where labor is in demand and brings higher wages. So long as the unions act simply upon this right and do not assume to dictate to those who do not belong to these organizations, or compel unlawfully those who do, we shall never oppose their efforts.

To say these associations do not always adopt a wise policy is to say no more than can be said of parliaments, cabinets, or any other human organization. To say that at times they have overstepped law is but to repeat history. But we think they are learning how much more powerful is peaceful, unyielding firmness than fitful aggression, which has always in the end damaged the cause of labor.

We, therefore—while we sympathize with the contractors, who, heeding not the note of warning sounded months ago, have made contracts on the ten-hour basis—feel sure that, through the passive resistance policy, eight hours per day will have to be conceded.

The result of the concession upon the workmen themselves remains to be determined. That it might benefit them, if the time reclaimed from labor were rightly employed, cannot be doubted that they will, as a mass, so use the time, we entertain some doubts.

An immediate effect of the reduction in the hours of manual labor will be the increased use of labor-saving machinery and the invention of new machines. So far from injuring the workingman, this will, on the contrary, improve his condition.

It will enable employers to pay higher wages for manual labor and still maintain their margin of profits. From this time forth, improvements in building appliances will find an increased demand. Who knows but that we shall find the necessity of the builders giving birth not only to machines for elevating mortar and bricks, but to brick-laying machines? Such an invention is on the cards, and may be nearer to realization than is imagined by some.

STEAM ON THE ERIE CANAL.

SINCE the offering of the tempting prize, $100,000, by the State of New York for the best practicable method of propelling canal-boats by steam on the Erie Canal, discussion and invention have been stimulated, till all who have had anything to say have said it, and those who have the genius of invention have striven to put their ideas into shape for the competitive trial, whenever that shall take place, under the direction of the commissioners appointed.

But there is a class of skeptics, who boldly declare that the offer of the prize is a farce; that the building of a boat answering to the conditions named in the act authorizing the prize is an impossibility; and who laugh derisively at the "simpletons," as they style those who they think are deluded by it.

We have a word for these skeptics.

In the first place, the natural geniuses who depend upon heaven-born inspiration and who eschew mathematics, will indeed be lucky if they succeed in meeting conditions which require the closest and most careful computation. This is a matter of figures, and it can be demonstrated that boats *may be* built of the dimensions stipulated and carry the requisite load. But they can never attain the required speed, say the objectors. A number of years ago, experiments were performed which answer this objection fully. A number of trials of a steam-propeller boat on the Erie Canal itself showed that a speed of from three to five miles per hour can be obtained with a properly modelled boat, without injurious side swells or any other drawbacks. The only thing that rendered this experiment unsuccessful was defective engineering. The engine consumed too much fuel. A tun of freight could be moved cheaper by horses.

We venture to say that a really fine engine was never yet put into an American canal-boat, and that this prize about which people are contending will be won—if won at all—only by skillful engineering.

But again, say the objectors, it is impossible to make a boat of the required tunnage that will possess the right model for speed. To this we demur, but we repeat that such a boat will not be built by guesswork.

We recently illustrated a device invented by Mr. Goodwin, which, in our opinion, will carry the required load and move at the required speed. We are in possession of facts in regard to another boat now building which will, we are certain, fulfill both these conditions, and we doubt not there are others not yet made public.

The final point upon which these experiments will turn is, therefore, that of economy. The commissioners have made public their opinion that nothing is to be feared from side swells, and the experiment above alluded to proves their opinion to be well grounded.

That boat which will carry the required quantity of freight one mile the cheapest, and maintain this standard, will be the boat that will win; and that boat will be no result of a sudden bright thought or spontaneous inspiration. It will be the outcome of scientific principles, applied as only the skillful engineer can apply them, and as they yet have never been applied to canal navigation in this country.

It will be gathered that we deem the problem thus placed before inventors is capable of a successful solution, and that the prize will really be awarded. Whoever gets it will, however, win it by the same refined practice that has made river and ocean steam navigation successful.

BOILER EXPLOSIONS.

To reach the point where we discover that we know nothing, is to come to the starting point of real knowledge upon any subject. Before coming to this conclusion which is the threshold of learning, we generally do a great deal of theorizing. This is well, since by putting our theories to the test we usually find them so worthless that we abandon them and return to the true scientific method, humbly acknowledging our ignorance.

This is precisely the present scientific status in regard to boiler explosions. To say that we know boilers burst from overpressure amounts to nothing, since cylinders of hydraulic presses, cannons, air-bubbles, and even Wall Street bubbles, do the same. Overpressure is only the immediate cause. Science is never content with immediate causes. What causes the overpressure? A supply greater than the demand will be the ready answer of many. But this will not satisfy. How is it that boilers burst, under circumstances carefully arranged to prevent excessive accumulation of steam? How about the anomalies? Will any one have the hardihood to say there are no anomalous explosions? To such we say you have not yet attained to the threshold of knowledge.

There is so much to be learned on this all-important subject that they who should know most about it, having made steam a life study, now ask Congress to authorize the President of the United States to make an appropriation for the continuance of the series of experiments begun at Sandy Hook last year. One hundred thousand dollars is asked—not a dollar too much—and to the prayer we most heartily say Amen! The subject is of national importance. The money could not be better spent. There has been noise enough about bursting boilers; let us now get some light, in the Baconian fashion. Let us experiment.

Judge Bradley, of the United States Supreme Court, has addressed an able letter to Secretary Boutwell, urging the above appropriation and inclosing a draft of a law for the consideration of Congress.

In this letter he points out the fact that the great expense of such experiments will prevent them from being made by private enterprise. He states that nearly all our positive knowledge on the subject of boiler explosions is derived from experiments made under the auspices of the Franklin Institute thirty-five years ago. Their experiments were, however, made upon model boilers constructed for the purpose, and of a type varying much from many boilers now largely used. We should experiment on real working boilers of various sizes new and old.

What we need to know is thus ably told by Judge Bradley:—

1. "To detect the faults in the ordinary construction of boilers." 2. "To adopt more perfect means of preventing dangerous pressure." 3. "To acquire such certainty as to the true causes of disasters by explosions, that the penal laws on the subject may be strictly and intelligently enforced, and thereby owners, constructors, and those having charge of boilers may be more careful and diligent in the performance of their duties to the public."

Could money be better used than in attaining this knowledge? Let the press speak out so that the "Tite Barnacles" shall hear, and we shall get the appropriation, and other appropriations on the top of it if needed. We have had our fill of jobs. Let the Government now make a small investment in useful knowledge.

OUR CORRESPONDENCE.

OUR readers will observe that we this week commence the publication of a QUERY COLUMN, the purpose of which is sufficiently set forth in the proper place. We trust this feature will meet with hearty approval, and that those desiring practical information will not be slow to avail themselves of its advantages, while those who can contribute the results of experience will be equally willing to "give that they may receive."

By cordial co-operation of correspondents this can be made the most valuable feature of our paper.

We also request general correspondence upon all practical subjects which we will carefully put into shape for publication, so that no one need hesitate to communicate with us through fear of unskillful writing. It is the industrial skill acquired in actual practice of which we would avail ourselves; to this we will add such skill as we possess in preparing articles for the press.

Every communication received shall be carefully read and considered, and, if some should be rejected, remember that many reasons exist for discrimination in matter designed for publication, and all rejected manuscript will be returned with reasons for a refusal, when stamps are forwarded to prepay postage.

THE BECKWITH SEWING-MACHINE.

THIS little machine, of which the reader will find an advertisement on our outside page, is a marvel of simplicity, while at the same time it is no mere plaything like many of the cheap machines heretofore offered to the public. It will do plain seaming, embroider, hem, and tuck, and its work is really good, as we have reason to know from its use several months in the writer's family. It is self feeding, and requires scarcely any effort to operate it. It is used by many who have larger machines, as it may be carried from place to place as easy as a reticule, and may be taken along for an afternoon call or an evening visit. The machine sells rapidly, and we have seen a very large number of highly commendatory testimonials from those who, like us, testify to its merits from actual experience in its use.

THE BAXTER ENGINE.

IT is a rare, if not an unprecedented thing, that a portable engine in the market as short a time as this has been has attained the popularity and extensive sale realized by the Baxter Engine. We are informed that the sale now averages two per day and is constantly increasing. The reasons for this popularity lie in the cheapness, safety, compactness, and economy in consumption of fuel, which are the prominent characteristics of these engines. Safe as a parlor stove, and not occupying more space than an ordinary domestic hot-air furnace, they may be used anywhere where light power is required, with no more attention than is necessary to supply them with water and fuel, and to keep their bearings oiled. Any ordinary mechanic can set them up, and a boy can run

them. To any one who desires to purchase a first-class portable engine they will repay a thorough examination. Though we know a very large number of persons who are using them, we never yet heard any one speak otherwise than well of them.

It is, therefore, with pleasure that we invite our readers' attention to the advertisement of this engine which appears in our last page.

HIGH AND LOW CHEMISTS.

OUR chemical readers will find on another page the beginning of what will probably prove to be an interesting, instructive, and amusing controversy, bearing the above title. We reserve, for the present, all comment upon the merits of the cases made out by the two sides in the dispute. The article in question is extracted from the *American Chemist*. The subject has an important bearing upon commerce, and will be read with attention by all manufacturers and importers of chemicals.

NEW PUBLICATIONS.

THE IMMIGRANT BUILDER; OR, PRACTICAL HINTS TO HANDY MEN. Showing clearly how to plan and construct Dwellings in the Bush, on the Prairie, or elsewhere, cheaply and well, with Wood, Earth, or Gravel. Copiously illustrated by C. P. Dwyer, Architect, Editor of Sloan's *Architectural Review*. Author of the "Economic Cottage Builder," etc., etc. Philadelphia: Claxton, Remsen & Haffelfinger.

A practical book written by a practical man and with a laudable object. The design is to furnish exact instruction to immigrants for utilizing to the best advantage whatever material may be at hand for building purposes.

Beginning with the log cabin, the author gives complete and minute directions for constructing all its parts, so that with ordinary ingenuity and intelligence, and the aid of this little book, any one might, without any experience, build himself a home in the forest, several forms of the log cabin being fully discussed.

The author then tells the immigrant how to build a slab house, plank and stud house, balloon house, frame house, and house of earth, of adobe or sun-dried brick, of gravel or concrete, and of béton or cement block construction.

The book is clearly written and illustrated. The author has himself executed constructions in each and every mode of building spoken of, and is therefore well qualified for his task.

He appropriately dedicates the work "to all adventurous men, whose ambition is to make a home and found a fortune under difficulties and in any location, and with whatever means nature may supply," and it should be in the hands of all such.

We are indebted to the Bureau of Labor of Massachusetts for a copy of the

THIRD ANNUAL REPORT OF THE BUREAU OF STATISTICS OF LABOR OF MASSACHUSETTS: Embracing the Account of its Operations and Inquiries from March 1, 1871, to March 1, 1872. Published by Wright & Potter, State Printers, 79 Milk Street, corner of Federal, Boston.

The institution and maintenance by the State of such a bureau cannot be too highly commended, and the gentlemen, whose indefatigable and judicious labors have produced the work before us are entitled not only to the thanks of the Commonwealth of Massachusetts, but of the country at large.

The condition of the laboring classes, and the relations between capital and labor, are the overshadowing questions in the practical social science of the day, and they are questions to the solution of which facts and statistics are indispensable.

In this report we have facts in great number, and arranged with care and judgment. It would be impossible here even to allude to the different classes of subjects examined into and treated upon by the bureau. A very interesting portion of the work is an account of the visits by members of the bureau to different parts of the State, with testimony from employers, physicians, citizens, and workingmen, in reply to inquiries as to wages, hours of labor, mode of living, cleanliness, opportunities for education, etc. On the subject of Chinese labor at North Adams, the bureau does not seem to have been very successful in getting information from Mr. C. T. Sampson, who is inclined to be very reticent, and closes a communication to the bureau as follows:—"So far as I know I have not interfered with any law of my country or State. The men are satisfied with their work and wages, and I am satisfied with them. They receive their wages monthly, and use them as they see fit. Now, unless there is some law to compel me to do so, I shall not make known the agreement between myself and the Chinamen in my employ."

The report is full of interesting reading, and to any one who is desirous of being well and entertainingly informed as to the various industries of Massachusetts is invaluable.

THE June *Galaxy* opens with a timely article by Justin McCarthy on "Sir Charles Dilke and the English Republicans," in which that clever essayist draws a spirited picture of the leading Republicans of England. Ivan Turgenief's story called "Faust" is concluded. General Custer continues his series, "My Life on the Plains." "The Woman Movement in Wyoming" is by General Edward M. Lee, who held a high position in the young Territory when the franchise was given to women, and hence is able to write of the experiment from intimate personal knowledge. "Brahmins and Swells," by a writer whose name is not given, discusses with ability and sharpness certain features of our social life, the term "Brahmin" being used to designate the intellectual element of society, and "Swell" the merely fashionable element. Albert Rhodes writes of "The English at Home." "Modern Languages in the American College" is a thoughtful essay on a subject which is just now engaging the interest of every one who studies our college system. Other stories are more chapters of "The Eustace Diamonds," "A Case of Conscience," and "The Cave of the Winds." The poetry of the number is by Nora Perry, Miss Woolson, and Mrs. Ritter. The editorial department, as usual, discusses literature, science, art, politics and society, and the Club Room adds humor and pathos.

NEW AMERICAN PATENTS.

UNDER this head we shall give a weekly summary of the more important American and English Patents.

AUTOMATIC OILER FOR STEAM-ENGINES.—Thomas Sims, Philadelphia, Pa.—*May* 14.—Four beveled faces are formed on the valve-stem, with corresponding seats in the bore of the body of the oiler, constructed to operate with the plenum and the vacuum of the steam-cylinder of an engine for the purpose of automatically oiling the same. There is steam space between the oil-cup and the surrounding case in combination with a passage and channels in the body of the oiler, so that pressure is transmitted to the oil for the purpose of forcing it as required to and over the parts to be lubricated.

SLOP-PAIL.—John G. Roth, New York City.—*May* 14.—This invention consists in a cover for slop-pails composed of a dished or conical cover proper with an opening for escape of liquid into the pail below, and an overhanging lip or flange for preventing the upward escape of the liquid poured upon the cover. There is, also, in combination with the cover described, a counter-balanced stench-trap, which allows the opening in the cover; also, a stem-handle in combination with the parts already described, which combinations form separate claims. A claim has also been allowed upon the peculiar construction of the stench-trap, and another upon a combination of the dished cover, the overhanging lip or flange, and an upper cover or lid fitting the flange—five claims in all.

GAS GENERATOR AND CARBURETER.—John H. Steiner, Cincinnati, Ohio.—*May* 14.—A rectangular box is divided by one or more partitions into two or more generating chambers. These chambers have removable perforated false bottoms, and are provided with rectangular, open, perforated troughs for holding scrap-metal. Gas is admitted to the carbureter by a combination of pipes and one or more automatic valves, the latter forming the subject of a special claim. The generator being supplied with a liquid volatile hydrocarbon, the gas is enriched by its passage through the apparatus.

PROCESS AND APPARATUS FOR THE MANUFACTURE OF INDIGO.—Theodore T. Woodruff, Philadelphia, Pa., assignor of one-half his right to Edward S. Morris of the same place.—*May* 14.—Three separate patents have been issued to this inventor. One is for a process of oxydizing the freshly-fermented aqueous extract of the indigo plant by currents of air forcibly driven through every part of the same by a combination of air pumps, tubes and a paddle wheel or its equivalent, and a tank, upon which apparatus a separate claim has been allowed. Another patent has been issued upon a process of drying the freshly-oxydized indigo, which consists in subjecting thin strata placed on draining cloths in trays to a strong, continuous current of dry, cold, or warm air. The apparatus for this process is covered by a special claim, and it consists of changeable draining and drying trays, drain-troughs, and the air current produced in any suitable manner. Thirdly, the indigo thus made is patented as an improved article of manufacture.

FLY TRAP.—Milton V. Bulla, South Bend, Ind.—*May* 14.—This is a combination of a conical cylinder having openings with a flanged ring and shade rings, whereby the traditional invitation to "walk in, Mr. Fly," is offered in a most inviting manner, and the deluded pleasure-seekers entering in search of sweets find too late that they must stay in.

FURNACE FOR SOLDERING TIN LEAVES.—George W. Fisher, Baltimore, Md.—*May* 14.—A floating furnace, having a series of floating rims formed to receive various sized cans, is placed in a bath of melted solder. The floating rims are provided with suitable ledges to support the cans, and also have pedal fixtures which are used in combination with a cooling table. There is also an arrangement of dampers with plates which form flues for regulating the heat of the floating rims uniformly.

ICE CREAM FREEZER.—Charles Gooch, Cincinnati, O.—*May* 14.—The main features of this invention are a horizontal driving shaft provided with bevel gearing and vertical driving and coupling shafts, and carrying gears both mounted in a frame and impelling dashers with stems which couple with the shafts. This apparatus works in tubs mounted on trucks, and running on parallel ways, supported on a bed frame.

JET CONDENSER FOR STEAM-ENGINES.—Gordon W. Hall Havana, N. Y.—*May* 14.—This invention consists, first, in a combination of a perforated injection pipe with a condenser chamber and exhaust water pipe; second, in a steam condenser, having an exhaust pipe, a perforated injection pipe with large apertures on the under side, and directly over the mouth of the exhaust tube; third, a combination and arrangement of the condenser with a check-valve with the exhaust pipe, perforated injection tube, and pump.

CANAL-BOAT PROPULSION.—I, Joseph Hilgerd, New York City.—*May* 14.—This invention consists in the employment of two conical wheels made air and water-tight, with sliding spiral buckets and attached to the same shaft, which wheels, by their revolution, propel the boat. In combination with these wheels and with the hull of the boat two side keels are used.

MANUFACTURE OF STEEL.—James J. Johnston, Columbiana, O., assignor to S. D. Hubbard & Co., Pittsburg, Pa.—*May* 14.—This invention consists in mixing heated pulverized iron ore, nitrate of soda, and the black oxyd of manganese with molten cast iron, to produce steel therefrom.

PURIFYING GAS.—Wladyslaw Theodore Kosinski, Philadelphia, assignor of one-third of his right to George W. Gill of the same place.—*May* 14.—This is a mode of purifying gas by passing it through alternate layers of lime and charcoal mixed with acetate of lead placed in a suitable apparatus.

PROCESS OF PREPARING FISH FOR FOOD.—Isaac L. Stanley, New York City.—*May* 21.—This invention has for its object the softening of the bones of menhaden and other fish, and preparing said fish for food. To this end the fish are first put, after being dressed and prepared—that is, cleaned externally and internally, into open tin or other suitable boxes or vessels and place the same in a steam chest which is afterward closed. In this condition the fish are steamed with steam of 212° Fahrenheit, or thereabouts, for five hours, more or less, after which they are taken out of this steam chest and put on tables to cool and drain for about five or six hours. The fish are then packed in tin boxes of a suitable size for the market, and the boxes filled with olive or other oil, and afterwards closed and the covers soldered or sealed. The boxes containing the fish are next put into a tank or chest which is afterwards closed and heated by steam or otherwise by a temperature of from 217° to 220° Fahrenheit, or thereabouts, for a period of from two to five hours, according to the size of the fish or its bones.

IMPROVEMENT IN SEWING MACHINES.—John Spiers, New York City.—*May* 21.—This invention consists in a mode of connecting the needle-arm with the needle-bar, whereby the easy and straight operation of the latter by the former is provided for without the intervention of a link.

PRINTING TELEGRAPH.—John E. Smith, New York City.—*May* 21.—The primary object of this invention is to produce a rapid and reliable printing telegraph which shall require but one main circuit and dispense with local batteries, and which will be found especially useful for telegraphing or reporting stock exchange quotations and transactions, also for private lines. The invention consists, firstly, in a certain application of an electro-magnetic shunt and its connections, for reducing the resistance of the line and causing the printing to be done by the force of the main current. Secondly, in a certain unison mechanism whereby each station is made to bring the type wheels of all the instruments in the same circuit into harmony with its transmitting apparatus. Thirdly, in a peculiar arrangement for stock exchange quotations of the characters on the type wheel for the purpose of effecting a rapid transmission of fractional numbers. Fourthly, in a certain combination of the shunt, the unison mechanism, the type-wheel, the escapement, the clockwork, the printing magnet, and a lever and roller, the whole composing for the most part the receiving portion of a printing telegraph, whereby both speed and reliability are insured.

PAINT-CAN.—James F. Drummond, New York City.—*May* 21.—The improved can, although mainly designed to hold paints mixed for use, is equally applicable to other purposes or uses. It consists in a novel construction of the can at its mouth and in a lid made to fit the latter, whereby tightness is obtained without any liability to stick, and every facility is afforded for reclosing the can.

GORING MACHINE.—Charles D. Bigelow, Brooklyn, N. Y.—*May* 21.—This invention is designed to be used in the manufacture of boots and shoes having gores of elastic material in their sides, and consists in certain novel devices or combinations of devices applied to a machine for pasting or uniting the gores to the vamp and counter or other parts. These devices include a guide pattern constructed to cover the portion of the gore which is intended to be left exposed when applied to the boot or shoe to be made, thus protecting said exposed portion from the paste or cement used to unite the gore with its adjacent parts, likewise said pattern serving as a guide to place or arrange such parts in proper relation for lapping on or over the margins of the gore between said pattern and gauges having the gore in between them. This guide pattern may either be adjustable or fixed, but it is preferred to make it adjustable to suit different widths of gore, and to provide it with a gauge or gauges substantially as here inafter described. In the operation of the machine such guide pattern is brought down upon the gore, and after the parts to be joined to it, previously smeared with paste or cement on their margins, have been set up against the sides of the pattern, clamping or pressing strips, also preferably made adjustable to suit different widths and angular shapes of gore, are brought down upon the lapped portion of the work on either side of the pattern, and the gore and its adjacent parts firmly pressed together and united. This straight action of the guide pattern and presser is preferable to an up and down and lateral movement of parts, and

by means of these improvements not only may uniformity and rapidity of work be secured, but the pitch of gore and set of a shoe be accurately insured.

OFFICIAL LIST OF PATENTS

ISSUED FROM THE UNITED STATES PATENT OFFICE

For the Week ending May 21, 1872,

AND EACH BEARING THAT DATE.

[Reported officially for the "American Artisan."]

126,863.—COMBINED WASHSTAND AND WRITING-DESK.—J. J. Arnaud, Boston, Mass.
126,864.—MACHINE FOR MAKING PIPING.—J. Ayers, Chicago, Ill.
126,865.—PLOW.—B. F. Baker, Ballston Spa, N. Y.
126,866.—HORSE HAY-FORK.—J. R. Benedict, Marion, N. Y.
126,867.—SPRING-SEAT FOR WAGONS.—G. W. Bennett, Avon, N. Y.
126,868.—MACHINE FOR UNTWISTING AND CARDING ROPE.—J. Blick, Camden Town, England.
126,869.—TAP FOR WATER-MAINS.—J. F. Brien, Washington, D. C.
126,870.—RAZOR-STROP.—S. M. Briggs, Woonsocket, R. I.
126,871.—WINDMILL.—N. Buck and F. A. Smith, Genoa, Ill.
126,872.—SASH-HOLDER.—I. Buckman, Williamsburg, N. Y.
126,873.—MITER-BOX.—C. Caton, Coshocton, Ohio.
126,874.—LAMP COOKING APPARATUS.—J. G. Cooey, St. John, Canada.
126,875.—MANUFACTURE OF COTTON-GIN SAW-TEETH.—T. C. Craven, Northampton, asgr. to J. W. Labaree, Springfield, Mass.
126,876.—BOOT-JACK.—H. Crocker, Brighton, Mass.
126,877.—WATER-WHEEL.—W. A. Crowell, Lime Rock, Town of Salisbury, Conn.
126,878.—MEDICATED BATH APPARATUS.—J. Davenport, Philadelphia, Pa.
126,879.—SPRING COUPLING FOR VEHICLES.—H. P. Dolson Highland, N. Y.
126,880.—BLAST DEVICE FOR FACILITATING THE WELDING OF ENDS OF TUBES.—J. Doyle, New York City, asgr. to himself and S. Drew, Kingston, Mass.
126,881.—WOOD PAVEMENT.—M. Flanigan, Detroit, Mich.
126,882.—MEDICAL COMPOUND FOR THE CURE OF FEVER AND AGUE.—G. D. A. Gay, administrator of the estate of G. W. Gay, deceased, Bath, Me.
126,883.—FEED-MILL.—G. W. Gibson, Dryden, N. Y.
126,884.—MACHINE FOR MAKING PIPE-ELBOWS.—L. C. Goodale, Cincinnati, Ohio.
126,885.—MOUNTING FOR SHOW-CARDS.—B. T. Harris, Brooklyn, N. Y. Antedated May 4, 1872.
126,886.—COMBINED FEED BOX AND STANCHION.—W. I. Harris and J. W. Harris, Newport, N. Y.
126,887.—LUBRICATING COMPOUND FOR SEWING-MACHINES.—P. Heid, Aurora, Ind.
126,888.—PRUNING-SHEARS.—D. Keethler, Mount Orab, Ohio.
126,889.—TREADLE FOR SEWING-MACHINE.—G. Lowden, Brooklyn, N. Y.
126,890.—APPARATUS FOR ELEVATING AND CARRYING MATERIALS FOR BUILDINGS.—M. F. Lyons, Brooklyn, N. Y.
126,891.—SASH-HOLDER.—A. Maxwell, Shelburne Falls, Mass.
126,892.—DEVICE FOR LOCKING AND STRAPPING TRUNKS.—J. K. Mayo, Brooklyn, N. Y.
126,893.—WASHING MACHINE.—M. F. McIntyre, Girard, Pa., asgr. to himself and J. Webster.
126,894.—PROCESS OF WELDING BRASS OR ALLOY OF COPPER TO IRON OR STEEL.—G. R. Meneely, West Troy, N. Y.
126,895.—CLAMP.—J. F. Metz, asgr. of one-half of his right to J. Wilkinson, Baltimore, Md.
126,896.—SHOE-LAST.—W. J. B. Mills, Philadelphia, Pa.
126,897.—FIELD THRASHING AND SEPARATING MACHINE.—J. G. Mohler, Jr., Ephrata, Pa.
126,898.—STEAM VACUUM-PUMP.—J. M. Morehead, Brooklyn, N. Y.
126,899.—STEAM-TRAP.—J. M. Morehead, Brooklyn, N. Y.
126,900.—PROPELLER CARRIAGE.—G. T. Palmer, Brooklyn, N. Y.
126,901.—BOOK-HOLDER.—C. Phelps, Clayton, N. Y. Ante-dated April 30, 1872.
126,902.—BORING MACHINE.—C. E. Pierce, Westminster, Md.
126,903.—DOOR-SECURER.—S. A. Pool, Memphis, Tenn.
126,904.—TREATMENT OF PHOSPHATES FOR THE MANUFACTURE OF FERTILIZERS, ETC.—N. A. Pratt, Charleston, S. C., and G. T. Lewis, Philadelphia, Pa.
126,905.—SOLDERING-IRON.—H. S. Saroni, Cincinnati, Ohio. Ante-dated April 30, 1872.
126,906.—MACHINERY FOR PROPELLING BOATS.—E. Savage, Albany, N. Y.
126,907.—DOOR-LATCH.—S. W. Skinner, Lyons, N. Y.
126,908.—DUST-PROTECTOR FOR WATCHES.—P. M. Statzell, asgr. to Statzell, Englehart & Englehart, Philadelphia, Pa.
126,909.—PROCESS FOR PRESERVING IRON.—W. H. Sterling, New York City.
126,910.—CHUCK FOR HOLDING DRILLS.—W. H. Stevens, East Brookfield, Mass.
126,911.—SEWING-MACHINE.—A. Stocker, asgr. to himself and O Paddock, Watertown, N. Y.
126,912.—HORSE-POWER.—O. O. Storle, asgr. to himself and J. O. Overby, Milwaukee, Wis.
126,913.—RUFFLER FOR SEWING-MACHINES.—E. J. Toof, Fort Madison, Iowa.
126,914.—FOLDING-STOOL.—C. B. Turnbull, Baltimore, Md.
126,915.—DEVICE TO AID IN IRONING CLOTHES.—C. S. Whipple, asgr. of one-half of his right to N. A. Chapman, Waterford, Conn.
126,916.—EYELETING MACHINE.—J. E. Wiggin, asgr. to H. H. Mawhinney, Stoneham, Mass.
126,917.—ATTACHMENT TO SODA-WATER APPARATUS.—M. S. Andrews, Somerville, asgr. to J. W. Tufts, Medford, Mass.
126,918.—COUPLING FOR ROPE-BANDS.—H. Badcock, Pittsburg, Pa.
126,919.—HARVESTER.—N. A. Baker, asgr. to himself and J. O'Hara, Jun., Covington, Ky.
126,920.—TUG-BUCKLE.—J. C. Barrows, Centerville, Iowa.
126,921.—SEWING-MACHINE.—W. G. Beckwith, Newark, N. J., asgr. to the Beckwith Sewing-machine Co., New York City.
126,922.—PROCESS AND APPARATUS FOR REDUCING THE ORES OF IRON.—T. S. Blair, Pittsburg, Pa.
126,923.—MANUFACTURE OF WROUGHT-IRON AND STEEL FROM IRON SPONGE.—T. S. Blair, Pittsburg, Pa.
126,924.—IRON SPONGE.—T. S. Blair, Pittsburg, Pa.
126,925.—BOBBIN-WINDER FOR SEWING-MACHINES.—G. A. Brady, Chicago, Ill.
126,926.—FILTER.—J. Brady, New York City.
126,927.—DAMPER FOR FIREPLACES.—J. Bridgham, New York City.
126,928.—GATE.—H. Brouse, Wellington, Ohio.
126,929.—MACHINE FOR FINISHING DRAIN-TILES.—A. L. Brown, London, Ohio.
126,930.—DOG FOR SAW-MILLS.—D. Chase, Orange, Mass.
126,931.—DUST-PAN BRUSH-HOLDER.—W. M. Conger, Newark, N. J.
126,932.—HARVESTER.—S. Crawford, London, Canada.
126,933.—FERTILIZER.—J. P. Crutchfield, Fayette Corner, Tenn.
126,934.—DRAUGHT ATTACHMENT TO PLOWS.—S. H. Dailey, Olcott, N. Y.
126,935.—ELEVATOR.—A. B. Darling and J. Bones, New York City.
126,936.—FLOUR-BOLT.—E. Davies and J. Gerrard, Liverpool, Great Britain. Ante-dated May 4, 1872.
126,937.—ROTARY PUDDLING FURNACE.—J. Davies, Knoxville, Tenn.
126,938.—METHOD OF BALLASTING VESSELS IN PORT.—F. Demartini and J. Chertizza, Brooklyn, N. Y.
126,939.—FENCE-WIRE STRETCHER.—D. J. Denmark, Vergil, and P. P. Hill, Alto, Ill.
126,940.—HYDRAULIC BETON.—J. Drevet, Paris, France.
126,941.—EARTH-AUGER.—X. Earle, Depere, Wis.
126,942.—Canceled.
126,943.—END-GATE FOR WAGONS.—C. W. Fallick, Beaver Falls, Pa.
126,944.—TYPE-SETTING MACHINE.—J. M. Farnham, asgr. to G. B. Hawley and S. D. Sperry, Hartford, Conn.
126,945.—DUST-BRUSH.—G. G. Finn, Cleveland, Ohio.
126,946.—STEAM-BOILER FURNACE.—M. A. Foster, St. Louis, Mo.
126,947.—SASH-BALANCE.—B. Fraze, Newark, N. J.
126,948.—MEDICAL COMPOUND OR BITTERS.—J. Frechette, Chicago, Ill.
126,949.—DIE FOR MAKING CARTRIDGE-SHELLS.—J. Gardner, asgr. to the Winchester Repeating-arms Co., New Haven, Conn.
126,950.—FENCE.—A. A. Garver, Albion, Iowa.
126,951.—WATER AND GAS METER.—A. Guthrie and W. Guthrie, Chicago, Ill.
126,952.—PLOW.—J. S. Hall, Pittsburg, Pa.
126,953.—PROCESS OF MANUFACTURING INDIA-RUBBER PISTON-PACKING.—I. B. Harris, Edinburgh, Scotland.
126,954.—TOY-PISTOL.—B. Haviland and G. P. Gunn, Herkimer, N. Y.
126,955.—WINDMILL.—E. Heath, Fowlersville, N. Y. Ante-dated May 7, 1872.
126,956.—SEWING-MACHINE CASE.—G. Heckel, Belleville, Ill.
126,957.—MACHINE FOR MAKING CIGAR-MOLDS.—M. H. Helmerdinger, asgr. to C. Goddard, New York City.
126,958.—GATE.—N. B. Helm, Alden, Ill.
126,959.—Canceled.
126,960.—CIGAR MACHINE.—R. W. Heywood, Baltimore, Md. Ante-dated May 3, 1872.
126,961.—COMPOUND FOR THE CURE OF CHOLERA IN HOGS, ETC.—J. Holton and Mary J. Holton, Mahaska County, Iowa.
126,962.—IMPLEMENT FOR LOADING CARTRIDGES AND SETTING AND EJECTING CAPS.—H. B. Hooker, Rochester, N. Y.
126,963.—COUNTERSINK.—L. H. Hunt, Saxton's River, Vt.
126,964.—WAGON-BRAKE LOCK.—S. S. Hurlbut, Racine, Wis.
126,965.—BOILER FURNACE.—H. R. Ives, New Haven, Conn.
126,966.—SCREEN-FRAME FOR WINDOWS.—J. Jackson, Chicago, Ill.
126,967.—VELVET REEL.—Peder Jürgens, St. Paul, Minn.
126,968.—SAND AND GRAVEL SEPARATING MACHINE.—N. J. Keller, East Birmingham, Pa.
126,969.—FOLDING ROCKING-CHAIR.—C. Klink, Chicago, Ill.
126,970.—BED-BOTTOM.—G. D. Leonard, Chicago, Ill.
126,971.—SHEAVE FOR WIRE-ROPE.—R. Long, Scott Township (Temperanceville Post-office), Pa.
126,972.—EXTENSION-TABLE RAIL.—L. Lotz, Brooklyn, N. Y.
126,973.—CAR-COUPLING.—H. E. Marchand, asgr. of one-half his right to R. E. Cross, Louisville, Ky.
126,974.—WATER METER.—F. Marsland, Sing Sing, N. Y.
126,975.—TILTING MACHINE.—B. Mathews, Keyport, N. J.
126,976.—WHEEL-PLOW.—W. C. McCool, Guthrie Center, Iowa.
126,977.—SPRING BED-BOTTOM.—D. McMurchy, Jeffersonville, Ind.
126,978.—CHAIR-BACK AND CRADLE-END.—T. W. Moore, New York City.
126,979.—PHOTOGRAPHIC LENS.—R. Morrison, Brooklyn, E. D., asgr. to Scovill Manufacturing Co., New York City.
126,980.—LEAD-PENCIL.—T. H. Müller, Yonkers, N. Y.
126,981.—WATER METER.—H. Olney, New York City, asgr. to himself and L. B. Townsend, Malone, N. Y.
126,982.—CIRCULATION-VALVE FOR STEAM FIRE-ENGINES, ETC.—R. Pallett, New York City.
126,983.—MACHINE FOR SPLITTING HOOP-POLES.—J. Penney, Grand Rapids, Mich.
126,984.—EASY-CHAIR.—D. S. Rice, Portland, Maine.
126,985.—SEED-PLANTER.—A. Richards, Anderson, Texas.
126,986.—STALK-CHOPPER.—A. Richards, Anderson, Texas.
126,987.—LUBRICATING PACKING FOR JOURNALS.—J. T. Robinson, asgr. to I. M. Coles & Co., New York City.
126,988.—FEED-WATER HEATER FOR STEAM-BOILERS.—J. Rodgers, Clarington, Ohio.
126,989.—MANUFACTURE OF HYDRAULIC CEMENTS.—D. O. Saylor, Allentown, Pa.
126,990.—HEATING-STOVE.—E. B. Smith, Westfield, Mass.
126,991.—CULTIVATOR.—A. B. Springsteen, Schodack Landing, N. Y.
126,992.—STRIKING APPARATUS FOR BELLS, GONGS, ETC.—C. Stevens and G. M. Stevens, Boston, Mass.
126,993.—CAR-STARTER.—W. M. Stratton and W. E. Stratton, West Troy, N. Y. Ante-dated May 11, 1872.
126,994.—CARVING MACHINE.—B. J. Tayman, Philadelphia, Pa. Ante-dated May 8, 1872.
126,995.—GAUGE FOR SETTING CARRIAGE-AXLES.—L. Taylor asgr. to himself and J. H. Belser, Marlborough, Mass.
126,996.—WATER-WHEEL.—W. A. Terry, Bristol, Conn.
126,997.—PISTON AND VALVE ROD PACKING.—G. Tetley and C. D. B. Fisk, Providence, R. I.
126,998.—THREE-HORSE EQUALIZER.—A. L. Thomas, G. J Thomas, and T. N. Thomas, Lee's Summit, Mo.
126,999.—SKATING-WAND.—Kate S. Todd, Yankton, D. T.
127,000.—APPARATUS FOR LIGHTING GAS BY ELECTRICAL SPARKS.—J. Vansant, San Francisco, Cal.
127,001.—STOVE-PIPE FITTER.—W. Volk, Buffalo, N. Y.
127,002.—PROTECTOR FOR HORSES' TAILS.—C. A. Warren, Watertown, Conn.
127,003.—HAY ELEVATOR AND CARRIER.—J. H. White, Columbus City, Iowa.
127,004.—HYDROSTATIC SAFETY-LAMP.—H. S. Whitfield, Tuscaloosa, Ala.
127,005.—MEDICAL COMPOUND OR CARBOLATED COD-LIVER OIL.—J. H. Willson, Brooklyn, N. Y.
127,006.—INSIDE BLIND FOR HOUSES.—J. Wright and T. Thompsen, Elizabeth, N. J.
127,007.—KILN.—H. Aiken, Philadelphia, Pa.
127,008.—MANUFACTURE OF SULPHUROUS ACID.—N. P. Akin, Philmont, N. Y.
127,009.—RELIEF-VALVE FOR FIRE-ENGINES.—A. F. Allen, Providence, R. I.
127,010.—TRUNK-FASTENER.—B. Andrews, Philadelphia, Pa.
127,011.—ROTARY CUTTER FOR MOLDING STONE, ETC.—R. Ardrey, asgr. to himself, R. Pilkinton, and J. Kelly, Frankford, Pa.
127,012.—ICE-TONGS.—E. Bacher, asgr. to himself and A. Parker, Findley, Ohio.
127,013.—HEEL FOR BOOTS AND SHOES.—I. Banister, Newark, N. J.
127,014.—MEDICAL COMPOUND, OR FEVER AND AGUE REMEDY.—W. H. Barker, asgr. to W. R. Winslow, West Farms, N. Y.
127,015.—MACHINE FOR GORING SHOES.—C. D. Bigelow, Brooklyn, N. Y.
127,016.—CURTAIN-CORD CLAMP.—G. W. Bishop, Saratoga, N. Y.
127,017.—BRIDGE AND OTHER STRUCTURES.—A. Bonzano, asgr. to C. Reeves & Co., Phœnixville, Pa.
127,018.—TURN-TABLE FOR PIVOT-BRIDGES.—A. Bonzano, asgr. to C. Reeves & Co, Phœnixville, Pa.
127,019.—WROUGHT-IRON COLUMN.—A. Bonzano, asgr. to C. Reeves & Co., Phœnixville, Pa.
127,020.—METHOD OF CUTTING SOLES FROM SIDES OF LEATHER.—S. Boyd, Marlborough, Mass., asgr. by mesne-assignments, to Woodley Heel and Sole Cutting Company, New Haven, Conn.
127,021.—WAGON-AXLE.—H. T. Briggs, Moline, Ill.
127,022.—CLOTHES AND HAT RACK COMBINED.—O. F. Burgess, asgr. of one-half of his right to E. Mather, Decorah, Iowa. Ante-dated May 9, 1872.
127,023.—TUCK-MARKER FOR SEWING-MACHINES.—R. G. Bush, Jamestown, N. Y.
127,024.—BOLT FOR BARN-DOORS, ETC.—W. Campbell, Belleville, Mich.
127,025.—PISTON-ROD FOR STEAM-ENGINES.—J. F. Carll, Pleasantville, Pa.
127,026.—BENCH PLANE.—M. Chittenden, Danbury, Ohio. Ante-dated May 9, 1872.
127,027.—SASH-HOLDER.—C. B. Clark, Buffalo, N. Y.
127,028.—CRUTCH.—L. Crandall, New York City.
127,029.—SOFA-BED.—M. Crosby, Boston, Mass.
127,030.—CHURN.—R. Daniels, Woodstock, Vt.
127,031.—APPARATUS FOR CARBURETING AIR.—H. G. Dayton, Maysville, Ky.
127,032.—USE OF CASEINE FOR MAKING PRINTER'S BLOCKS.—T. J. Denne, Mile End, London, asgr. of one-half of his right to A. Hentschel, Islington, England.
127,033.—PULLEY FOR BAND-SAWS.—W. H. Doane, Cincinnati, Ohio.
127,034.—PAINT-CAN.—J. F. Drummond, New York City.
127,035.—SEALING DIP-PIPE OF GAS APPARATUS.—J. R. Farnum, Waltham, Mass.
127,036.—GRAIN-BINDER.—N. B. Fassett, asgr. to himself and A. K. Fassett, St. Louis, Mo. Ante-dated May 11, 1872.
127,037.—MOP-HEAD.—A. Field, Jericho, Vt.
127,038.—FLEXIBLE LIP-FORMED VALVE.—E. Field, Middlesex County, England.
127,039.—CARBURETER.—J. B. Fish, Providence, Pa.
127,040.—WHIP-SOCKET.—M. Flanigan, Detroit, Mich.
127,041.—FIRE-ALARM SIGNAL-BOX.—G. Floyd, Cincinnati, Ohio.
127,042.—WATER-TUYERES FOR FORGES, ETC.—J. Frearson, Birmingham, England.
127,043.—HEMMER FOR SEWING-MACHINES.—S. A. Gage, Rochester, N. Y.
127,044.—CHAIR-SEAT.—G. Gardner, asgr. of two-thirds of his right to Gardner & Gardner, Glenn Gardner, N. J.
127,045.—CHAIR-SEAT.—G. Gardner, asgr. of two-thirds of his right to Gardner & Gardner, Glenn Gardner, N. J.

127,046.—ATTACHING KNOBS TO THEIR SPINDLES.—J. R. Gill, Hamilton, and W. R. Baker, Wellington Square, Canada.

127,047.—MAST AND SPAR FOR VESSEL.—W. T. Griffenberg, Wilmington, Del.

127,048.—BELT-BUCKLE.—P. M. Haas, Youngstown, Ohio.

127,049.—HOISTING APPARATUS.—F. H. H mbleton, Baltimore, Md.

127,050.—BRICK-KILN.—S. M. Hamilton, Baltimore, Md. Ante-dated May 6, 1872.

127,051.—CORN-SHELLER AND SEPARATOR.—B. Harnish, Lancaster, and D. H. Harnish, Pequea, Pa.

127,052.—WASHING MACHINE.—W. F. Harper, Leesburg, Tex.

127,053.—THREAD-CUTTER FOR SEWING-MACHINES.—M. Harris, Jamestown, N. Y.

127,054.—MANUFACTURE OF SHOES.—J. E. Hayes, Farmington, N. H.

127,055.—LOOM.—J. Hillsley, asgr. to himself and J. T. Hillsley, Manayunk, Pa.

127,056.—UTILIZING TIN-SCRAP.—E. Hirschberg, New York City.

127,057.—SPRING BED-BOTTOM.—L. Hull, Charlestown, Mass.

127,058.—SAND-PUMP REEL.—H. T. Hunt, Titusville, Pa.

127,059.—ILLUMINATING SIGN.—C. F. Jacobsen, New York City.

127,060.—MEDICAL COMPOUND.—H. D. Jewett and I. D. Jewett, St. Omer, Ind.

127,061.—CIRCULAR-SAW TEETH.—N. Johnson, Jasper, N. Y.

127,062.—SAW MILL.—N. Johnson, Jasper, N. Y.

127,063.—CARRIAGE-WHEEL.—J. A. Johnston, Topeka, Kan.

127,064.—CARRIAGE-WHEEL.—J. A. Johnston, Topeka, Kan.

127,065.—DUMPING WHEELBARROW.—G. H. Kanmacher, Chicago, Ill.

127,066.—STAIR-RAIL BRACKET.—J. C. Kelley, Boston, Mass.

127,067.—HYDROSTATIC LAMP.—E. D. Kendall, New York City.

127,068.—FIRE-KINDLING.—J. W. Kennedy, Plainfield, Conn.

127,069.—OSCILLATING VALVE FOR STEAM-ENGINES.—W. B. Kennedy, Louisville, Ky.

127,070.—INVALID BEDSTEAD.—C. G. Kuhn, New York City.

127,071.—FENCE.—E. Kyes, Nunda, N. Y.

127,072.—HORSE-POWER.—H. B. Larzelere, asgr. to himself and D. Hulshizer, Jr., Doylestown, Pa.

127,073.—PICKLE AND CRUET STAND.—T. Leach, asgr. to Reed & Barton, Taunton, Mass.

127,074.—HEATED METALLIC MOLDS FOR FORMING CROCKERY WARE.—E. Leak, H. Moore, and J. Taylor, Trenton, N. J.

127,075.—WASHING MACHINE.—J. K. Leedy, Toms Brook, Va.

127,076.—WATER-WHEEL.—E. G. Libby, Medford, asgr. to himself and J. W. Upham, Worcester, Mass.

127,077.—COMBINED GARDEN HOE AND RAKE.—G. W. Lockwood, Fairport, N. Y.

127,078.—MACHINE FOR DRESSING THE TEETH OF CIRCULAR SAWS.—J. Lough, Buckingham, Canada.

127,079.—POTATO-BUG COLLECTOR.—R. P. Main, Oregon, Wis.

127,080.—HEMMER AND TUCKER FOR SEWING-MACHINES.—W. N. Martin, Boston, Mass.

127,081.—MINK-COOLER.—E. L. Matteson, Randolph, N. Y.

127,082.—COMBINATION OF A HEATING-FURNACE AND A COOKING-STOVE.—B. McConnell, Philadelphia, Pa.

127,083.—FLOOD FENCE.—W. R. McFarland, Paris, Tenn.

127,084.—HEATING-PLATE FOR HEATING SOLDERING TOOLS.—L. McMurray, Baltimore, Md.

127,085.—HITCHING-POST.—J. Melchers, Detroit, Mich.

127,086.—COFFEE-ROASTER.—G. W. Merrick, Adrian, Mich.

127,087.—PUMP-HANDLE BRACKET.—D. S. Messler, asgr. to C. G. Blatchley, Philadelphia, Pa.

127,088.—RECORDING DYNAMOMETER.—L. Miller, Akron, Ohio.

127,089.—ATTACHING KNOBS TO THEIR SPINDLES.—E. M. Mix and J. E. Mix, Westfield, N. Y.

127,090.—MANUFACTURE OF HEEL-STIFFENERS FOR BOOTS AND SHOES.—J. R. Moffitt, Chelsea, Mass.

127,091.—SPARK-ARRESTER.—J. R. Moffitt, Chelsea, Mass.

127,092.—TRANSPORTATION OIL-CAN.—J. C. Moore, asgr. to himself and G. Booth, Philadelphia, Pa.

127,093.—FIFTH-WHEEL FOR VEHICLES.—S. Moreland, asgr. to himself, B. Hegge, and T. Brinker, Covington, Ky.

127,094.—LIGHTNING-ROD.—J. M. Mott, Chicago, Ill.

127,095.—TURN-TABLE FOR CHANGING CAR-TRUCKS.—J. S. Newberry, E. C. Dean, J. McMillan, Detroit, Mich.

127,096.—CARRIAGE-SPRING SUPPORTER.—N. A. Newton, Schoolcraft, Mich.

127,097.—PRESERVING AND MAKING PASTE.—G. G. Noah, Charlestown, Mass

127,098.—MODE OF COVERING ROUNDED ARTICLES WITH LEATHER.—J. H. Osgood, Boston, Mass.

127,099.—FENCE-POST.—S. H. Palmer, Norvell, Mich.

127,100.—SASH-HOLDER.—W. Patton, Towanda, Pa.

127,101.—FORMING STAMPED ARTICLES FROM SHEET ZINC.—A. T. Perkins, asgr. of one-half of his right to N. Waterman, Toledo, Ohio.

127,102.—MANUFACTURE OF DYE FROM ANILINE.—R. Pinkney, London, England.

127,103.—CORDER FOR SEWING-MACHINES.—A. N. Price and M. Harris, Jamestown, N. Y.

127,104.—BAYONET SCABBARD.—E. Rice, Cambridge, Mass., asgr. to himself and Schuyler, Hartley & Graham, New York City.

127,105.—DROP-LIGHT COUPLING.—R. S. Roeschlaub, Quincy, Ill.

127,106.—SAWING MACHINE.—N. Schaumloeffel and G. P. Davis, Martinsville, N. J.

127,107.—ANIMAL POKE.—I. W. Sherwood, Mount Morris, N. Y.

127,108.—LAMP.—A. M. Silber and F. White, London, England.

127,109.—BELT-SHIFTER.—W. H. H. Sisum, Newark, N. J. Ante-dated May 20, 1872.

127,110.—PLOW.—H. B. Smith, Tremont, Ill.

127,111.—PRINTING TELEGRAPH.—J. E. Smith, New York City.

127,112.—PUNCHING MACHINE.—O. Smith, Bridgeton, N. J.

127,113.—PEN-HOLDER TIP.—D. M. Somers, Brooklyn, N. Y.

127,114.—SEWING-MACHINE.—J. Speirs, asgr. to the Manhattan Sewing-machine Co., New York City. Ante-dated May 6, 1872.

127,115.—PROCESS FOR PREPARING FISH FOR FOOD.—I. L. Stanley, asgr. to the American Sardine Co., New York City.

127,116.—HAY-GATHERER.—A. Strean, Harrodsburg, Ind.

127,117.—PERMUTATION LOCK.—J. T. Taylor, Newnan, Ga. Ante-dated May 11, 1872.

127,118.—TOBACCO-BOX.—W. C. Thomas and E. C. Pilkinton, Richmond, Va.

127,119.—SOLDERING-TOOL.—J. A. Tillery, asgr. to himself and S. A. Ewalt, Baltimore, Md.

127,120.—SOLDERING-TOOL.—J. A. Tillery and S. A. Ewalt, Baltimore, Md.

127,121.—TOOL FOR GROOVING THE RINGS OF SPINNING-FRAMES.—C. E. Trowbridge, Whitinsville, Mass.

127,122.—BAG-HOLDER.—I. Vance and C. Rogers, Pittsburg, Pa.

127,123.—APPARATUS FOR APPLYING MEDICINE TO THE EAR.—S. Van Etten, Corning, N. Y.

127,124.—EARTH-BORING MACHINE.—C. Vernier, Stryker, Ohio.

127,125.—TUNNELING MACHINE.—A. W. Von Schmidt, San Francisco, Cal.

127,126.—WATER METER.—W. O. Wakefield, Boston, Mass.

127,127.—CORN-SHELLER.—F. C. Whiley, Lancaster, Ohio.

127,128.—FAUCET.—H. G. Whitaker, West Brattleborough, Vt.

127,129.—MOTOR FOR SEWING-MACHINES.—C. L. Wilcox, West Williamsfield, Ohio.

127,130.—WASHING MACHINE.—E. Willcox, Hamburg, Iowa.

127,131.—ICE-ELEVATOR.—T. C. Wolking, Covington, Ky.

127,132.—DRILLING MACHINE.—E. J. Worcester and A. F. Prentice, asgrs. to A. F. Prentice, V. F. Prentice, and I. W. Jones, Worcester, Mass.

127,133.—WASHING MACHINE.—N. T. Worthley, Brunswick, Me.

127,134.—BABY-SWING.—J. H. Wygant and R. P. Paulison, Hackensack, N. J.

127,135.—WHIP-SOCKET.—C. A. Flesche, New Haven, Conn.

RE-ISSUES.

4,907.—MANUFACTURE OF PACKING FOR STEAM-ENGINES.—J. Glanding, asgr. to himself, D. H. Wilson, and E. S. Lowry, Philadelphia, Pa. Patent No. 77,275, dated April 28, 1868.

4,908.—CARRIAGE-SEAT.—S. P. Graham, asgr. to T. Comstock, London, Canada. Patent No. 115,842, dated June 13, 1871.

4,909.—CORDER FOR SEWING-MACHINES.—H. Horn, Fort Edward, asgr. to J. O. Fairbairn, Milwaukee, Wis. Patent No. 112,810, dated March 21, 1871.

4,910.—APPARATUS FOR GENERATING AND BURNING VAPORS FROM HYDROCARBONS.—J. Kidd, New York City. Patent No. 110,857, dated Jan. 10, 1871.

4,911.—MACHINE FOR UPSETTING METAL BARS.—A. Kloman, Pittsburg, Pa. Patent No. 55,674, dated June 19, 1866.

4,912.—BILLIARD-CUSHION OF RUBBER AND GUTTA-PERCHA.—J. Murphy, New York City. Patent No. 119,391, dated Sept. 26, 1871.

DESIGNS.

5,860.—CARPET-PATTERN.—J. Barrett, New York City, asgr. to the Parks & Wade Carpet Co., Palmer, Mass.

5,861.—SEWING-MACHINE BED.—W. G. Beckwith, New York City, asgr. to the Beckwith Sewing-machine Co., New York City.

5,862.—CARPET-PATTERN.—E. Demoussy, Paris, France, asgr. to J. Wild & Co., New York City.

5,863.—PORTABLE COOKING-RANGE.—J. Magee, asgr. to the Magee Furnace Company, Chelsea, Mass.

5,864.—OIL-CLOTH PATTERN.—C. T. Meyer and V. E. Meyer, Lyon's Farms, N. J.

5,865 to 5,872.—FLOOR OIL-CLOTH.—C. T. Meyer and V. E. Meyer, Lyon's Farms, N. Y.

5,873.—TEA-SERVICE.—W. Parkin, asgr. to Reed & Barton, Taunton, Mass.

5,874 and 5,875.—HITCHING-POST.—R. Wood, Philadelphia, Pa.

TRADE-MARKS.

821.—YEAST.—Fleischmann & Co., Riverside, near Cincinnati, Ohio.

822.—TABLE-SAUCE.—Halford Sauce Co., Boston, Mass.

823.—SMALL-BEER.—J. N. Hammond, Wayland, Mass.

824.—OILING APPARATUS.—S. Hutchinson, Jun., Salem, Mass.

825.—TEA.—S. A. King, New York City.

826.—PRINTING PRESSES.—V. E. Mauger, New York City.

827.—OILS, WAX, AND TALLOW.—J. C. Moore & Co., Philadelphia, Pa.

828.—MEN'S CLOTHING AND FURNISHING GOODS.—J. Seligman, Pontiac, Mich.

829.—SODA-WATER.—S. F. Simes, Philadelphia, Pa.

830.—WHISKY.—E. Walters, Baltimore, Md.

831.—DRUGGISTS' SUNDRIES.—R. H. Watson, Philadelphia, Pa.

832.—PAINT-DRIER.—A. Wheeler, Boston, Mass.

EXTENSIONS.

28,512.—CAR-WHEEL.—(No. 4,760, Div. A.)—S. P. Smith. May 29, 1860; patented in England, May 14, 1858; re-issued, by mesne-assignments to J. A. Woodbury, Feb. 13, 1872, in two divisions.

20,238.—SASH-FASTENER.—F. W. Brocksieper and J. B. Sargent, May 11, 1858; said J. B. Sargent, assignee.

20,233.—WORKING SHIP'S LOWER SAILS IN COURSES.—S. Very, Jun. May 11, 1858. (Sarah W. Very, administratrix.)

20,227.—HARVESTER.—(Div. A.)—J. S. Troxel. May 11, 1858; re-issued to W. N. Whiteley, assignee, June 11, 1867, No. 2,613.

20,227.—HARVESTER-REEL.—(Div. B.)—J. S. Troxel. May 11, 1858; re-ssued to W. N. Whiteley, assignee, August 20, 1867, No. 2,743.

APPLICATIONS FOR EXTENSIONS.

OPPONENTS of extensions must file *written* objections in the Patent Office at least 20 days before the day-of-hearing; and on that day, at noon, they must appear personally, or by proxy, at the Patent Office, and state the reasons of their opposition. All testimony—*pro* or *con*—must be taken and transmitted in accordance with the official rules, which will be furnished on application. The under-named patentees have recently petitioned for extensions (for seven years) of patents granted to them in the year 1858:—

EDWIN S. HOVEY, administrator of HIRAM H. HERRICK, deceased, Boston, Mass.—*Carpet-sweeper.*—Patented Aug. 17 1858; testimony will close on July 16, next; last day for filing arguments and examiner's report, July 26; day-of-hearing July 31.

HENRY G. BULKLEY, Cleveland, Ohio,—*Steam-heating Apparatus.*—Patented Aug. 17, 1858; testimony will close on July 16, next: last day for filing arguments and examiner's report July 26; day-of-hearing, July 31.

INCREASE C. PLANT, Macon, Ga.—*Metallic Band or Tie for Bales, etc.*—Patented Aug. 24, 1858; testimony will close on July 23, next; last day for filing arguments and examiner's report, Aug. 2; day-of-hearing, Aug. 7.

HENRY WATERMAN, Brooklyn, N. Y.—*Tempering Wire and Steel.*—Patented Aug. 24, 1858; and re-issued Feb. 14, 1865; testimony will close July 23, next; last day for filing arguments and examiner's report, Aug. 2; day-of-hearing, Aug. 7.

ABBIE C. BALDWIN, administratrix of FREDERICK BALDWIN, deceased, Janesville, Wis.—*Lathe for turning Beaded Work.*—Patented Aug. 24, 1858: testimony will close on July 23, next last day for filing arguments and examiner's report, Aug. 2 day-of-hearing, Aug. 7.

STEPHEN BARNES, New Haven, Conn.—*Manufacture of Brushes.*—Patented Sept. 7, 1858; testimony will close on Aug. 6, next; last day for filing arguments and examiner's report Aug. 16; day-of-hearing, Aug. 21.

SAMUEL NOBLET, Halifax, Pa.—*Mode of preventing Nuts from Unscrewing.*—Patented Sept. 21, 1858; testimony will close on Aug. 20, next; last day for filing arguments and examiner's report, Aug. 30; day-of-hearing, Sept. 4.

ENGLISH PATENT JOURNAL.

LIST OF APPLICATIONS FOR PATENTS

ON WHICH

Provisional Protections

HAVE BEEN OBTAINED IN ENGLAND BY OR FOR AMERICAN INVENTORS.

[*This list is condensed weekly from the "Journal of the British Commissioners of Patents," expressly for the* "AMERICAN ARTISAN."]

1,175.—MACHINE FOR FILLING METALLIC BOOT-HEELS, ETC.—Richardson, Hucker & Blake, Providence, R. I.—April 19 1872.

1,186.—CONSTRUCTION OF STEREOPTICONS.—Busby & Woodbury, Philadelphia, Pa.—April 20, 1872.

1,191.—EMBROIDERY ATTACHMENTS FOR SEWING-MACHINES.—Howe Machine Co., Bridgeport, Conn.—April 20, 1872.

1,202.—LAMP-BURNER.—A. G. Myers, New York City.—April 22 1872.

1,207.—ELECTRIC TELEGRAPH APPARATUS.—G. Little, Rutherford Park, N. J.—April 22, 1872.

1,210.—MOTIVE-POWER ENGINE.—A. C. Lewis, Brooklyn, N. Y —April 23, 1872.

1,226.—BRAKES.—G. Westinghouse, Jun., Pittsburg, Pa.—Apr 24, 1872.

1,244.—STEAM-ENGINE.—W. Baxter, Newark, N. J.—April 1872.

1,258.—ELASTIC HOSE STOCKINGS FOR HORSES.—Lewis & Way Astoria, N. Y.—April 27, 1872.

1,190.—CONTROLLING, ETC., THE PACKING OF PISTONS, ETC.—J. H. Teal, Memphis, Tenn.—April 20, 1872.

1,241.—SCREW-DRIVERS.—Charles Law, Pittston, Pa.—April 25, 1872.

1,270.—STEAM-GENERATORS.—J. Goulding, Worcester, Mass.—April 27, 1872.

1,300.—REAPING-MACHINES.—W. A. Wood, Hoosic Falls, N. Y. —April 30, 1872.

1,302.—MANUFACTURE OF STEEL.—G. F. Wilson, Providence R. I.—April 30, 1872.

1,377.—DRYING, ETC., LEAF TOBACCO, ETC.—J. D. Culp, Gilroy Cal.—May 6, 1872.

QUERIES.

WE will hereafter publish in this column such queries as are from their nature likely to elicit practical answers of genera utility to our readers. Questions not relating to business, and of merely personal interest to the querist, will not be published here, but we will willingly give them such attention in private correspondence, as we can, without neglect of more important duties. We earnestly solicit from our readers either queries or answers, of such a character as we have specified, and we hope by this means to make our paper a valuable medium of intercommunication between them.

1. SOLDERING OLD TIN-WARE.—I have been using zinc dissolved in muriatic acid in soldering old tin-ware. It does not work well. Can I use anything better? J. B.

2. INDELIBLE DRAWING-INK.—How can I make an indelible drawing-ink? Also, a drawing-ink that I can cross-hatch without blotting or waiting for it to dry? R. W.

3. BLUING PISTOL BARRELS.—How is the permanent blue given to pistol barrels, etc.? W. H. J.

4. TEMPERING SMALL STEEL SPRINGS.—How can I temper small flat steel springs in quantity? C. T.

5. HARDENING TALLOW.—What is the process of hardening tallow? A. F.

6. FLOW OF LIQUIDS.—What relation does the actual flow of a liquid from an orifice bear to the theoretical flow? S. W.

7. STEATITE.—What are the industrial uses of this mineral? C. H. V.

8. CISTERN WATER.—The water flows from my roof directly into the cistern. In hot weather it becomes impure. Will filtering before it flows into the cistern render it fit to drink? If so, how can I make a good cheap filter for this purpose? W. VAN B.

9. LEATHER SCRAPS.—How can leather scraps be utilized? J. M.

10. POWER FOR SAWS.—Does the number of teeth in a saw add to or diminish the power necessary to perform a given amount of cutting with it? R. H. B.

ANSWERS TO QUERIES.

J. B., OF N. J.—That an unauthorized party has been using your invention would be admissible evidence of its utility in prosecuting a claim for damages.

T. H., OF PA.—You cannot patent a principle. You may, however, patent a new mode of applying a principle to a useful purpose.

L. M., OF MAINE.—A caveat is valid only for one year unless renewed. This may be done under the existing law as often as desired. However, when an application is made for a patent on the same improvement, the caveat ceases to be of any value.

H. L. B., OF VT.—Cushioning by exhaust closure through the use of independent cams or eccentrics is good practice. On some engines the giving of some lead to the induction valves, together with early exhaust closure, is also advisable.

J. H., OF LA.—What you call "sweating" on the outside of vessels containing liquids is caused by condensation of the moisture in the air upon the cold surface.

R. P., OF MICH.—A hollow iron bar, containing the same amount of metal as a solid one, and of the same length, would resist a greater strain if suspended at its ends, and the weight applied between the points of suspension, than a solid bar. A solid bar will resist a greater strain of torsion or twisting, or of rupture, by being drawn longitudinally apart, than a hollow one of the same diameter.

R. H. P., OF N. H.—Cover your long steam-pipe with hair or wool felting an inch and a half thick, and you will have no further trouble with condensation.

L. T. G., OF TEXAS.—Liquid glue is made by adding a little muriatic acid to common glue when it is dissolved and ready for use.

D. G. B., OF PA.—The sediment found in your boiler is evidently a concentration of spent dye-stuffs discharged into the stream from the works above you. We know of no remedy except to feed your boiler from a purer source.

ENGRAVINGS OF NEW INVENTIONS.

WE would call the *special attention* of INVENTORS and PATENTEES to the advantages which must result from having engravings of new machines, tools, etc., published in the AMERICAN ARTISAN. The illustrations shown in the present number are fair specimens of the skill and taste of our artists. We are prepared to execute such engravings *at short notice* and *very moderate prices*—in fact, we require only the mere cost of the engraver's labor, charging nothing for a large amount of space devoted to descriptive details, and (whenever requested, we shall subsequently send the engraved blocks to the inventor, by express, for use in circulars, handbills, or other purposes.

None but ORIGINAL illustrations—preferably executed by *our own engravers*—will be published in the AMERICAN ARTISAN. Distant patentees desiring to have their inventions illustrated and described in our columns, should at once send us a small model of their machine, by express (prepaid); or mail a good photograph, together with their LETTERS-PATENT, to our address. We will then promptly examine the same, and return a reply, stating the precise expense of the engraving, the payment of which will be always required in *advance*. Address models, documents, etc., for the above object, as follows:—

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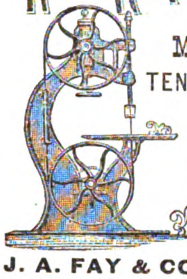

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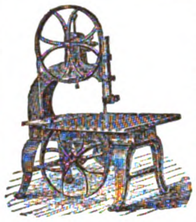

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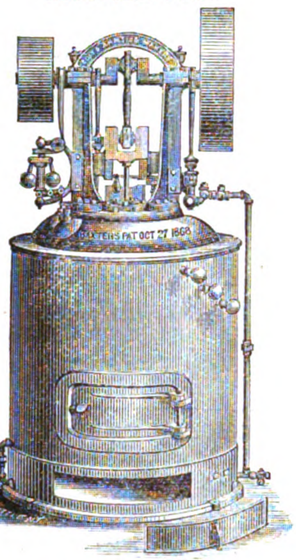

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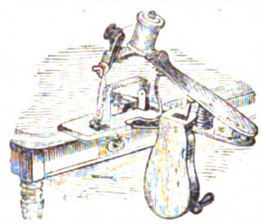

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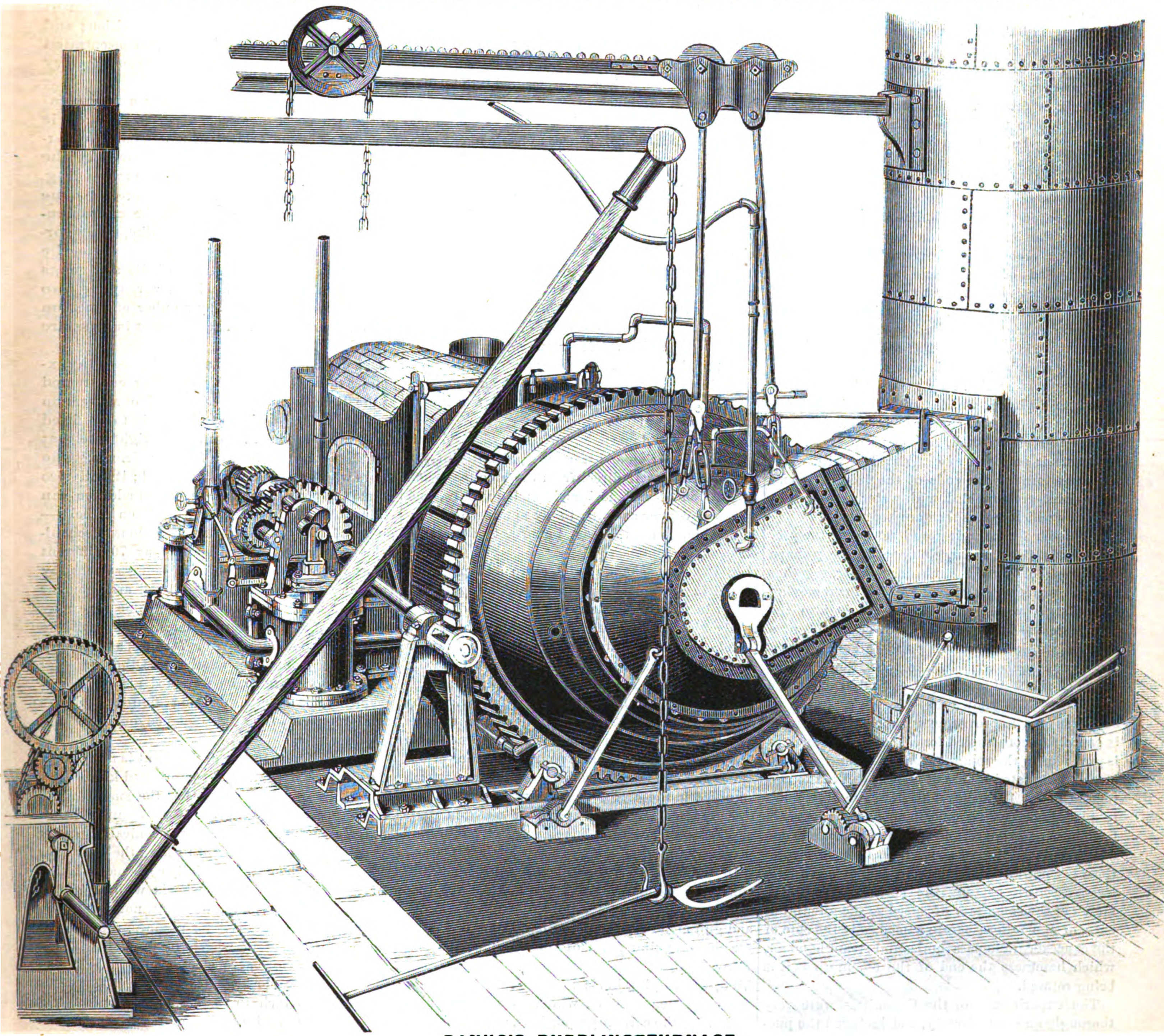
Danks's Puddling Furnace.

PERHAPS no other recent invention has produced so great a sensation in the engineering world because the inventor's rights are contested in England, is public attention now concentrated upon this important improvement. Our illustration, nace is prepared from the report of the Committee of the Iron and Steel Institute of England, who visited the United States to inspect the operation



DANKS'S PUDDLING FURNACE.

as Danks's puddling furnace. Not only on account of the results achieved by it—already noticed in previous issues of the AMERICAN ARTISAN—but therefore, will be timely and instructive. It gives an excellent representation of the apparatus.

The following excellent description of this furnace is prepared from the report of the Committee of the Iron and Steel Institute of England, who visited the United States to inspect the operation of these furnaces, and partly from our esteemed cotemporary the *Railway Review*.

The furnace consists of a horizontal revolving

chamber, which chamber intersects the fire-grate and an elbow flue leading to the uptake of the chimney. The shape of this chamber, when fettled, partakes of an ellipse. The two ends are brought in by means of two cast-iron rings forming a portion of the outer framework or structure. This structure rests by its periphery on four cast-iron friction wheels, fixed in framings, and it revolves between the fixed plate or fire-place and the elbow-joint above referred to. The furnace is driven by a pair of vertical reversible trunk engines, the spur-wheel on the crank-shaft being geared direct into a toothed wheel forming the periphery of the rotary furnace. The rotary portion referred to is formed of several cast-iron segments, which are held together by means of two cast-iron rings before named, one at each end slipping over the ends of the said castings. The inner shape of the castings which form the chamber is a series of dovetails running longitudinally, which are for the purpose of mechanically holding in the fix or fettling. The fire-grate is similar in construction to that of an ordinary furnace, the bridge being built in the end of the grate. It is provided with a pair of folding doors, which, when closed and dabbed with clay, form a closed chamber. Air is provided by means of a fan or blower, a portion is taken horizontally above the fuel, but the bulk is driven in underneath the bars. The elbow-joint above referred to forms the flue end of the whole apparatus, and it makes a short turn at right angles leading to the uptake of the chimney. The object of having this elbow connection is to allow of its being readily removed, in order to get at the interior of the revolving chamber. The piece or connection is suspended to a way above by means of a chain attached to a pinion, which pinion runs into a rack above. A pulley and chain are fixed on the same axis as the pinion, and, by means of these, the apparatus is removed and replaced at will. The two rings forming the ends of the fire-bridge and elbow-joint are provided with water pipes cast in them, by which means they are kept cool.

The tools for charging and removing the product consist (1) of a charging-pan of scoop shape capable of holding the full charge of pig, together with the squeezer slag; (2) of a fork for removing the charge, which is operated—as is also the charging-pan—with the aid of a crane; (3) of a receiving fork for receiving the ball and conveying to the squeezer. Of the tools, the squeezer by which the ball is manipulated only needs to be described. It is known as Winslow's, and, with additions and improvements made by Mr. Danks, is especially constructed for a heavy mass such as is produced in the rotary furnace. It consists, first, of two corrugated rollers of about 4 feet in the barrel and about 18 inches diameter; are horizontally placed, occupying one plane, and the journals fixed in strong frames, and are made to move in one direction at the rate of about from 15 to 20 revolutions per minute. Above these rollers is geared a large eccentric or cam, the periphery of which moves at the same rate of speed as the circumference of the rollers before named. At the side of the squeezer frame is a horizontal steam hammer, which hammers the end of the bloom up as it is being rotated.

The experiments of the Committee were very thorough and satisfactory, and included the puddling of both English and American iron and ores.

Speaking of this furnace, the *Journal of the Franklin Institute* says:—

The immense advantages which would result from the construction of a machine by which the tedious manual operation of the ordinary puddling process might be performed mechanically, and with greater rapidity, certainty, and regularity in quality of the product, have been perceived by iron-masters, and several attempts to solve the desirable problem have from time to time appeared; but not until the presentation by Mr. Danks of his invention and the announcement of its performance, has this great desideratum approached a practical realization.

The report (of the British Committee) is a practical acknowledgment of the successful solution of the problem of machine puddling, and a confirmation in every essential feature of the inventor's statements; and as such must be hailed with gratification as an assurance that another important step in advance has been made in the chief of the metallurgic arts. As a practical result, highly satisfactory doubtless to the inventor, we learn that an agreement has been entered into by Mr. Danks and a combination of English iron manufacturers of various districts, whereby the latter undertake to have 200 furnaces on his plan erected within six months, and as a consideration they agree to pay him at that time £50,000.

As we have above stated, the validity of Mr. Danks's claims is disputed in England. Measures have been taken on the part of the iron-masters who agreed to pay the above royalty, and it may prove that this inventor will yet be disappointed in his anticipated golden harvest. The result will be awaited with intense interest.

British Clock-making.

We condense from the *Mechanics' Magazine* the following description of the large clock manufacturing establishment of Messrs. Gillett & Bland, at Croydon, England:—

The primary department of the works is devoted to the reception and treatment, *ab initio*, of the raw material itself direct from the smelters, such as pig-iron of various brands and qualities, and ingots of copper and tin; to say nothing of scrap-iron, which is not the least important of metallic elements.

In the *Iron Foundry*, the scrap and pig iron, mixed in suitable proportions, according to the object in view, are reduced and converted by the combustion of charcoal, in alternate layers, in a cupola or blast furnace, which is cylindrical in form, and about six feet in height, terminating below in a trough. The blast is supplied through a blast-pipe, by the agency of a fan driven by steam, and making 2,500 revolutions per minute. The molten metal is run into iron pots, lined with fireclay, as customary, and poured into the various molds and mold-boxes, as formed from the patterns supplied to the molders of the various parts destined for the framework and other cast-iron parts of clocks and carillon machines for public and private buildings.

In the *Brass and Bell Foundry* are performed similar operations for melting, mixing, and casting the alloys of copper and tin required as brass and gun metal for the going parts, and bell-metal for the sounding parts, of the clock mechanism. Here are three charcoal furnaces of the ordinary kind, and varying in size, for the manipulation of the component metals, which, when molten together in the correct proportions, are cast in a series of iron mold-boxes, suitably prepared with patterns and sand.

In casting these different metals and alloys, it may be observed that the greatest care and skill are requisite to avoid flaws and imperfections, and obtain perfect homogeneity in the resulting metallic articles, so as to avoid sacrifice and loss of minute and careful labor on defective castings.

The *Pattern Shop*, fitted with lathes, tools, and apparatus for the variety of work demanded for use in the iron and brass foundries, completes what may be termed the preparatory departments, after leaving which the articles pass into special departments according to the nature of the work, to be wrought, manipulated, and fitted up in suitably finished form. Of these fitting departments the chief in importance is that wherein cathedral, church, and turret clocks, and patent carillon machines, are manufactured.

The *Musical Clock and Astronomical Regulator Shop* is devoted solely and entirely to the class of work which demands the very highest degree of mechanical and manual skill and precision; and it presents, therefore, as it were, a concentrated essence of all that a clock and a clock factory should be.

We need hardly observe that for astronomical purposes a clock of clocks, a perfect paragon, is essential; but the subject of astronomical observations and calculations may be deemed by the many as being too abstruse for general reading. We will, therefore, advert to the more mundane interest of a good musical clock, the companionable minister to youth and age alike, for use, ornament, and pleasure. Clocks that strike the hours and chime the quarters on bells and gongs are here made in every kind and variety; as also musical clocks that play any number of tunes on any number of bells. The bells cast in brass are turned and tuned.

One of the most remarkable and noteworthy examples of a musical clock was being constructed at the time of our inspection, and our attention was particularly directed to it. It is to be fitted for Capt. Hans Busk into an old upright case that for 150 years has been a family heirloom. The hours will be struck on a large bell; it will also chime the quarters on 8 bells, and in addition can chime the "Cambridge quarters" on 4 bells—either of them at will, by an ingenious mechanical arrangement. It will also play 70 different tunes upon 16 bells, the tune being selected by turning a hand on a dial; and by an arrangement of small stud to be pushed, the same tune may be repeated any number of times. There will be 10 barrels, each adapted for 7 tunes, and readily substituted one for another. Other musical clocks in hand are to be provided also with mechanical movements, dancing figures, soldiers marching past to the tunes played on the bells: all automatic.

The machinery in this department is necessarily of the most delicate and complicated kind. Pinion-cutting engines, for cutting the smallest pinions out of the solid (in lieu of the common drawn pinion); engines for cutting the conically spirally grooved fusees; machine for making the cutters for the teeth of wheels; beautifully constructed lathes for turning the smallest wheels with rigid and minute accuracy; and, last but not least, two wheel-cutting and dividing engines, the one for cutting the teeth of wheels of gun-metal, brass, iron, or steel for large clocks, and the other the like for house clocks. Hereby wheels from one-eighth of an inch to 12 feet diameter can be cut with any required number of teeth. These machines were originally made on the premises, and improved from time to time, so that they are now the most perfect machines of the kind in this country. They are beautifully constructed and replete with ingenious mechanical devices adapting them for

cutting teeth of all shapes and sizes, at any angle or in any position, on wheels of any thickness. The smoothness and accuracy of the work is such that the teeth are never touched after the wheel leaves the engine.

This is one of the most important processes and machines in the whole range of clock-making operations. The machine itself is constituted of two distinct movements; the one, of rotation in a horizontal plane, is applied to the intermittent revolution of the wheel to be cut, and the other, of rotation in a vertical or variably inclined plane, is applied to the cutter. Upon the bed of the engine is attached a fixed brass circular plane, upon the surface of which are marked a series of rings, each divided into definite spaces by holes pierced at corresponding regular intervals. By these, the wheel to be operated upon can be made to make a complete revolution by any desired number of intermittent steps, corresponding to the number of teeth required to be cut; it is firmly attached to a collar, revolving on the vertical axis of the dividing plate, and to which is fixed a lever arm with index point resting on the brass plate, and capable of adjustment at any radial distance from the axis, to coincide with any of the concentric annular series of holes. As each tooth is cut, the workman shifts the wheel round by the interval of one space between the holes, the movement being arrested by the dropping of the point into the next hole; the next tooth is then cut, and so on, until the revolution is completed. The frame carrying the cutter has three independent motions; it slides horizontally along guides regulated by screw motion so as to be set at any distance from the wheel, according to the diameter of the wheel operated upon; its normal position is vertical, but it may be inclined forwards at any desired angle so as to cut radial teeth on a bevel-wheel of any angle; and it may be inclined to the right or to the left at any angle, so as to cut teeth not radial, but diagonally on the rim of the wheel. The steel cutters are of every variety of form, according to the shape and size of the cogs desired, and are caused by a band V-pulley to rotate at a very high velocity, enabling them to cut through the metal of the wheel with marvelous ease and rapidity. These machines are triumphs of mechanical engineering.

All the processes and departments hitherto described refer to the framing and going parts of clocks made of metal. House clocks, however, require cases of different materials, and hence, one department is especially devoted to their manufacture in plain and fancy kinds, out of ornamental woods of every description suitable to varying climates. Here also are made the musical barrels for the carillon machines—peculiarly built up of hard wood pricked for seven tunes each, and studded with from 2,000 to 3,000 brass pins, exactly like the barrel of a musical box. The pricking of the music thereon is, as may be supposed, an operation requiring great care and nicety, and is the special and sole care of one operator.

The two large views represent respectively a church clock and the patent chiming or carillon machine applied in connection therewith. The improved construction results in a great diminution in size and weight of the whole apparatus, so that it is compact, light, and elegant in appearance, without decrease of power and effect. In the clock, the central part is devoted to the going mechanism with the pendulum below, and the vertical shaft above that works the hands on the dials by quadruple bevel-wheels and universal joints. The actuating power is, of course, a weight. On the right is seen the striking mechanism for striking the quarters; and on the left the like for hours; these also are actuated by weights.

Without describing more particularly the technical and mechanical details of the movement, we shall content ourselves by observing that, in addition to the improved arrangements of motive power and trains, every first-class clock has a "gravity" escapement in lieu of the "dead-beat," and is provided with an auxiliary "remontoir" to maintain the power and keep the works in motion during the operation of winding-up.

The carillon machinery has undoubtedly been brought to a high degree of perfection by this firm, and fairly eclipses everything else of the kind. The valuable principle of their patented invention lies in the separation of what was a combined action into two distinct parts. Customarily, the pins of the barrel effected first the elevation and then the blow of the hammer: as arranged by Messrs. Gillett & Bland, the work of the pins is confined to releasing the detents, and causing the hammer to strike the bell; simultaneously throwing forward a spring finger in the path of peculiar cam-wheels continuously revolving, which thereby immediately elevate the hammer again into the striking position. The effectiveness and precision of this mechanism must be seen to be appreciated; the advantage is in the equalization of the strain upon and work of the barrel, and in the great reduction in dimensions, weight, material, and cost, to say nothing of uniformity of effect and faithful rendering of the melody—in itself an immense gain. The motive power is obtained by weights, and the speed, as in the clocks, is regulated by revolving vanes, capable of easy and instantaneous adjustment. In short, this automatic musician is the perfection of its kind; and, by the addition of a *clavecin* or keyboard, chiming the bells to any tune, improvised or otherwise, is brought within the capacity of every one, ladies not excepted, who possess the requisite musical faculty.

This machinery is quite a specialty of the firm, who have labored long and earnestly to introduce and perfect it, and lately improvements have been devised whereby much heavier hammers can be raised and made to strike more rapidly, so as to be heard as far as the quarter chimes of the clock, which has never before been accomplished anywhere.

In this connection must be mentioned a recent invention about to be introduced as a timekeeper for practical use, under the title of "the chronoscope." It may be described as on the simple principle of a counting or registering apparatus, actuated by clockwork, and indicating, in large legible figures, the exact hour and minute throughout the twelve hours respectively of day and night, from 0h. 0m. and 0h. 1m., etc., up to 11h. 59m., etc., so that even "those who run may read." A series of equal-sized wheels is arranged side by side, and exposing to view through a slit or opening in the case broad rims, on which appropriate numbers are marked; on the right hand is a fixed index, the space indicating the duration of one minute; next adjoining is the seconds wheel, that has a peculiar intermittent motion, of downward revolution, within the range shown on the fixed index, followed by a sudden and immediate retrograde or upward movement, which carries the indicator back again to the top of the index. Simultaneously therewith the adjoining or minute wheel is engaged and carried round one-tenth of a whole revolution. When this minute wheel has completed one revolution (corresponding to 10 minutes) it engages in the adjoining wheel to the left (which may be called the 10-minute wheel), and shifts it round through one-twelfth of a revolution. Finally, when the 10-minute wheel has completed a full revolution, or one hour, it engages in the hour wheel, causing it to move through one-twelfth of its revolution; and at the end of the full revolution of the hour wheel, the set of wheels have returned to their original position, indicating 0h. 0m., or 12 o'clock. This method of indicating the march of "tempus edax rerum" possesses for certain purposes many and obvious advantages over the ordinary dial; for railway stations and public clocks in particular. Children and uneducated persons, generally more familiar with plain figures than with the (to them) mysterious dial, would be enabled to see the correct time at a glance. Moreover, time thus recorded would be legible at far greater distances, as individual figures can obviously be made larger than is possible proportionately with a clock-face; and the difficulty of distinguishing the hour and minute hand disappears. For clocks at harbors, seaports, lighthouses, beacons, landmarks, etc., to indicate the correct time—which is or may be longitude—to mariners, this principle would be inestimable.

Of the larger class of clocks it would be difficult to point out a finer example than the large clock at the International Exhibition of 1872, that next week, and throughout the season, will keep the myriad visitors to the Exposition and gardens *au courant* of fleeting time and pleasure. This clock is a masterpiece of workmanship, and well merits inspection, as it comprises many novelties. It strikes the hours on a bell of 25 cwt., and chimes the Westminster quarters on four smaller bells; the time is shown upon two dials, one 6 feet outside, facing the Horticultural Gardens, and the other inside, made of stained glass. The hours are struck by two mechanical figures, the full size of life, with large hammers, in a much more natural way than their congeners in Cheapside, of the Gog and Magog clock, made by the same firm. In the latter the figures are stationary, the arm being the clock hammer. But the figures at the Exhibition clock move round from the waist while striking, by intricate mechanism in the interior of the figure, actuated by the clock movement. The clock is inclosed in a glass case, and fixed at the southern entrance to the Horticultural Gardens, whence also the motions can be seen. The bells and figures are fixed above the outside dial facing the gardens. A special alarm apparatus is being prepared and fitted up for the purpose of giving preliminary and final announcements of closing time; and "ringing the visitors" out—a very useful, if a noisy, function.

Of cathedral, church, and turret clocks, Messrs. Gillett & Bland have constructed upwards of 400; we saw one being packed for India with its bell and 4 dials, and another for South America nearly ready.

It may not be generally known that Messrs. Gillett & Bland designed and manufactured the great clock exhibited by Benson at the International Exhibition, 1862; and the same may be said of Bennett's Gog and Magog clock in Cheapside. Among their numerous other works may also be counted the great clock for the Cathedral of Malaga, Spain; for St. Patrick's Cathedral, Dublin Madresfield Church, for Earl Beauchamp; Rossie Priory Church, for Lord Kinnaird; Croydon Parish Church, clock and chimes; the Boston chimes, playing twenty-eight tunes on forty-four Belgian

bells; at Bulstrode, for the Duke of Somerset; and the clock for the new Rochdale Town-hall. This clock is one of those most recently executed; it strikes the hours on a 50-cwt. bell, and the Westminster quarters on 4 bells. There are 4 dials, 12 feet in diameter in a square of 16 feet, glazed with patent opal glass, and illuminated with gas; these are generally considered to surpass in beauty of effect even the dials at the Houses of Parliament.

The clock frame is on an improved horizontal plan, and weighs 5 cwt., and is 5 feet 8 inches long, 22 inches wide, and 20 inches in height. The clock altogether, including hammer tails, etc., is 8 feet 3 inches long, 2 feet 8 inches wide, and 4 feet in height. The motive power is given by weights weighing over 20 cwt., suspended from the three iron barrels by patent iron wire lines, carried over pulleys at the top of the tower, and which fall a distance of 70 feet. As Mr. Broadbent's patent is applied to them, should the lines break at any time, the fall of the weights is prevented.

The escapement is an ingenious contrivance, called "the double three-legged gravity." The pendulum is a compensated one, made of drawn zinc and iron tubes. It will give some idea of the size and power of the clock when we state that there has been over 50 cwt. of metal used in the manufacture of its various parts, exclusive of pulleys, dials, and bells, and it contains 1,000 separate pieces. The carillon machine connected with this clock is now fast approaching completion. It will play 14 tunes on 13 bells, of which the tenor weighs 2½ tuns, and is the first made entirely on their improved patented principle. Other carillon machines are being made for Holsworthy Church, 8 bells; St. Stephen's, Hampstead, 14 tunes on 12 bells; and what will probably be the finest chimes in the country, at Worcester Cathedral, to play 28 tunes on 14 bells, the tenor weighing 4½ tuns.

How to fasten Rubber to Wood and Metal.

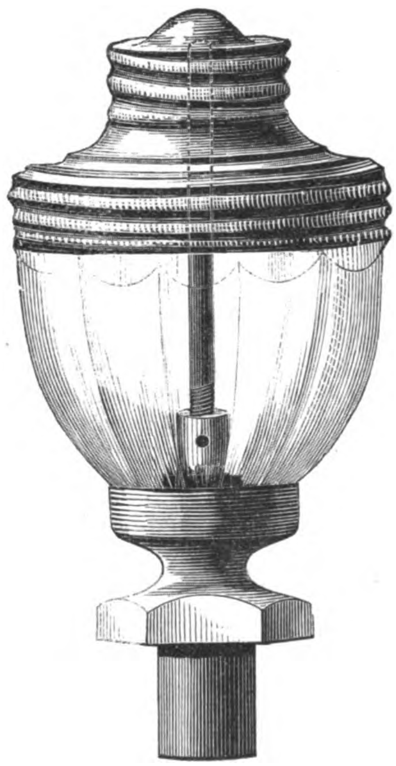
As rubber plates and rings are nowadays used almost exclusively for making connections between steam and other pipes and apparatus, much annoyance is often experienced by the impossibility or imperfection of an air-tight connection. This is obviated entirely by employing a cement which fastens alike well to the rubber and to the metal or wood. Such cement is prepared by a solution of shellac in ammonia. This is best made by soaking pulverized gum shellac in ten times its weight of strong ammonia, when a slimy mass is obtained, which in three to four weeks will become liquid without the use of hot water. This softens the rubber, and becomes, after volatilization of the ammonia, hard and impermeable to gases and fluids.

Bursting of a Large Fly-wheel.

A FEARFUL accident recently occurred at the York Iron Furnace, Lancaster, Pa. The immense fly-wheel, 20 feet in diameter and weighing about 20 tuns, burst asunder while running at a speed of 100 revolutions per minute. Two segments shot through the rolling-mill, cutting the heavy timbers of the building as if they were pipe-stems, passed through the roof, and landed on the track of the Northern Central Railway, about 100 yards distant, breaking one rail in two places and bending others. Three other segments of the wheel and a spoke were forced upward, and carried over the roof of the puddling furnace, landing in a meadow in the rear of the mill. These pieces weigh at least three tuns. When the immense girders of the rolling-mill were cut through, the whole structure toppled in a complete wreck. Three of the workmen were caught in the *débris*, and received such injuries that it is impossible for them to recover. One of them almost made his escape when his heel caught, and the falling timbers pressed him down on a mass of hot iron, burning him in a horrible manner. A number of others were more or less injured.—*Lancaster Enquirer*.

HOLLAND & CODY'S SELF-OILER.

THE accompanying engraving illustrates a new oiler for engines and other machinery, to which the manufacturers, Messrs. Holland & Cody, whose advertisement will be found on our outside page, have given the above title. The simplicity, cheapness, and effectiveness of this oiler constitute its claims to public favor. In these combined features it compares favorably with any oiler we have met with.



The body is of glass, tastily designed, and is furnished with a brass cap which screws directly on to the glass. To the bottom of the cistern is attached a brass tubular stem, into which the oil flows through ports communicating with the central longitudinal passage through the stem which conveys the oil to the bearing.

Into the top of this stem screws a rod, which, ascending as it is screwed in more or less, regulates the opening of the ports so that the flow of oil can be adjusted with the utmost exactness to the requirements of the bearings.

The upper part of this regulating rod is flattened, and is easily reached by screwing off a cover fitted to the central part of the brass cap, through which oil can be supplied to the cistern or reservoir, as required. The rod is very easily turned by the use of small pliers, and when once adjusted needs no further attention. If simplicity be justly considered a merit in this class of devices, this certainly possesses it in a marked degree, and the popularity of the oiler is daily demonstrated by large and increasing sales. It is one of the cheapest oilers in market.

Shad Growing.

SETH GREEN, the distinguished pisciculturist, in the employ of the State Fish Commissioners, has again established himself at Mull's fishing grounds, about two miles below Castleton, on the west bank of the Hudson River, where he will be engaged for the next two months in hatching shad for the purpose of re-stocking the river. During the past three seasons Mr. Green has hatched out an immense number, and the result is becoming manifest by the large increase in the number caught this season, and the decline in prices. Last season Mr. Green hatched out 8,500,000 young shad by his peculiar process. The young fish were turned loose into the river, and in course of time will return fully developed and in such numbers as to make them still more plentiful, and so cheap as to be enjoyed by the poorest. Last season, by direction of the Fish Commissioners of California, he transported over ten thousand young shad from Mull's Landing to California, and placed them in the Sacramento River, and no doubt is entertained that in a few years shad will be plenty on the Pacific coast. He started with about 15,000, and placed a few hundred in each of several rivers and lakes that he passed on the way.

Straw-board for Car-wheels.

MR. W. E. PARTRIDGE, in an article on the subject of paper car-wheels, published in the *National Car-builder*, says the first lot of straw-board was offered for sale in New York City in 1844, and consisted of only one or two tuns. This small lot was regarded by the box manufacturers with a good deal of indifference, and was bought by Mr. Butterfield, of the present firm of Mallory & Butterfield, who from the first took a great interest in the product. In 1855, so rapidly had the trade grown, the paper-box makers no longer made use of what are called band-box boards. The product of 1860 was only 8,060 tuns, while during the past year it is estimated at no less than 18,000 tuns. There are now about sixty straw-board mills in the country, and in case of a demand the product could easily be increased to 30,000 tuns. Aside from the uses now made of the material, including its recent applications to car-wheels, there are obviously many other purposes for which it may be made available in the range of the mechanic arts.

The question occurs as to whether we have not here a substitute for wood in many kinds of light and ornamental work where strength and durability are requisite? Some well-ascertained facts seem to justify an answer in the affirmative. This paper-board, when made into a panel, is stronger and lighter than wood; it has a perfect surface, will not shrink, and is not liable to warp. Doors made of it will bear a great deal of hard usage without showing it. It can be fashioned into any required form, and fastened in its place like an ordinary wood molding, and will take paints, oils, and varnish in the same way. These are points which any car-builder will readily appreciate. The writer has seen entire doors, saving the outside framing, made from a set of panels which were made in a single piece. These panels were an inch in thickness, and, by a peculiar arrangement of the paper inside, were partially hollow, which diminished the weight without impairing their strength. It is quite probable that a car-body might be lightened twenty-five per cent. by the use of this material instead of wood for panels, doors, and ornamental work. If proper precautions were taken, even the posts and all the framing above the truss-plank, except the ribs for the roof, could be made of this material.

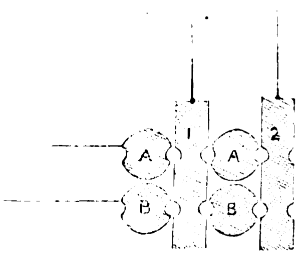
THE PEG SWITCH.

THE *Journal of the Telegraph* announces that this switch has been adopted as the standard by the Western Union Telegraph Co. From the journal referred to we condense the following description of this switch:—

The diagram shows the connections of the peg switch as adapted to the requirements of a way office. It is so simple, and yet so perfect, that only a very brief explanation of the reference marks upon the diagram will be necessary to a full understanding.

1 represents a vertical metallic bar or strip upon the switch, to which is connected a wire running into an office, and 2 represents the same wire going out. A and A' and B and B' are metallic buttons, to which are connected the instrument wires. All the buttons upon the same horizontal line are connected together at the back of the switch.

As shown in the cut, the circuit is "open." To close it, with instrument in circuit, it would be necessary only to insert two metal plugs or pegs; one at the orifice at B' and 2, and one at A and 1. The course of the current would then be as follows:—From the line at 1 through the peg connection at A to instrument; through instrument to B and B'; through the peg connection there to the line at 2, and so out to the main line. Should it be desired to connect the line through, without instrument in circuit, the insertion of pegs in the orifices of either A' or B' would effect the desired result.



The same form of switch, with a modification of connections, would answer for a terminal office.

For this, let it be understood that a wire, leading from a battery, one pole of which is grounded, is taken directly to one side of the instrument; through the instrument it goes to A; from A, if a peg be inserted in its orifice, it goes to 1 and to the main line.

If, instead of placing the peg at A and 1, it be placed at A' and 2, the instrument would be connected to line 2.

It will be seen that in the terminal form but one line wire is necessary to be on the switch, and but one wire to the instrument to form a circuit, while in the way form two of each are required.

A Colossal Flying Machine.

THE scheme for flying, which has thus far baffled the wits of ingenious men, still haunts the brain of Samuel A. King, of Boston, who proposes to construct a monster balloon, which in point of size shall outstrip anything of its kind ever brought into actual use in this country.

It is very appropriately called the "Colossus." The body of the balloon is a perfect sphere, except that there is the usual elongation on the lower side for the neck. Its circumference is one hundred and ninety-one feet, and its capacity is nearly one hundred thousand cubic feet. Only in the large cities could a sufficient supply of gas be found to fill it. Twelve hundred yards of forty-inch best Lyman mills cloth, furnished expressly for the purpose, were required in its construction, and five months have been devoted to the work, notwithstanding the fact that sewing-machines materially lessened both time and labor. Four barrels of oil-varnish, of the kind generally used by Mr. King to coat his balloons and to make them impervious to the gas, were used to cover the surface of the "Colossus." The cloth is in single thickness except on the top, where it is double to secure greater strength, and to make the mammoth envelope strong in other parts there are twenty-four stays or bands running entirely around it. The name is painted upon the side in letters seven feet high. Suspended to a network of strong cords will be two cars. The upper one is intended for scientific observations, and will be fitted up with scientific instruments for the accommodation of the observers. The lower car will contain the other passengers and the ballast. The collapsing cord, which is brought into use only when it is desirable to collapse the balloon and let out the gas suddenly, as for instance when a landing is made in a gale of wind, is sewed into a seam for the distance of seventy-five feet from the neck upward. In detaining the balloon upon the ground in alighting, three anchors will be used in place of one, which would be sufficient in the case of balloons of ordinary size. These anchors will be arranged in a peculiar manner, and in several particulars Mr. King has introduced improvements in connection with the balloon. The gas-envelope, netting, and basket will weigh fourteen hundred or fifteen hundred pounds. Filled with hydrogen gas, the "Colossus" would be able to carry between six thousand and seven thousand pounds into the air, and with carbureted hydrogen, or the common illuminating gas, which has much less buoyancy, fifteen or twenty passengers can be taken, together with scientific apparatus, and a sufficient quantity of ballast for a long voyage. A comparison with the size of some of the other balloons frequently used in Boston by Mr. King will assist our readers to form a better idea of its immensity. While the "Colossus" has a capacity of nearly one hundred thousand cubic feet, the "General Grant," with which Mr. King has made many ascensions, here and elsewhere, holds only fifteen thousand cubic feet. The "Queen of the Air" had a capacity of thirty-three thousand feet, the "Star-Spangled Banner" fifty thousand feet, and the "Hyperion," which on its first trip carried no less than eight persons from Boston a distance of seventy-five miles, and on the day following made another long voyage, a capacity of sixty-five thousand feet. The new monster is a veritable giant among Mr. King's numerous family of balloons.

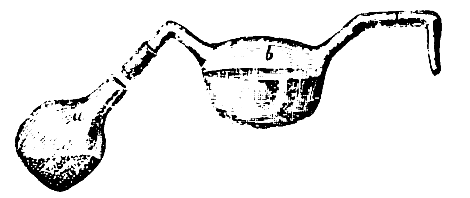
Marbles.

BOYS, do you know where your marbles are made? Possibly you are the happy owners of some fine old English marbles, beautifully variegated, or of some pure white "alleys." Or you may know the pride of ownership in a precious "taw" which seems to have some mysterious power of its own.

Various kinds of patent marbles have been manufactured. Many are made of potter's clay, glazed, and burned in a furnace; others of marble or alabaster. In Saxony, marbles are made by breaking a hard stone into square blocks with a hammer. The blocks are then assorted into groups of various sizes. About one hundred of the blocks are put upon a stone slab, which has been cut into concentric grooves. Hunt up the meanings of these two words in the dictionary, if you do not know them already. Over this slab is another of oak, supported by a lever, which is turned by the power of the mill, while little streams of water are let into the grooves to prevent the wood from getting too hot by friction, and also help make the marbles round. By this process, in about fifteen minutes' time, they are made ready for market. Only ordinary marbles are manufactured in this way. A mill containing three of these blocks will make 60,000 in a week. At other places, many processes are gone through with. After they have been "sorted" and worn down on grindstones, and scraped, they are completed by friction against each other in cylinders of hard wood or stone. They are polished by putting emery into the cylinders. They are colored in zinc-lined vessels and in small quantities, the coloring matter being poured upon them from time to time. The dust of calcined tin is applied to give them the last polish. Do you know that great quantities of marbles are sent to India and China? Most of the beautiful "agates" which you boys prize so highly come from a mill at Obenstein, on the Nahe, in Germany. Patent marbles are known by the names "Dutchman," "Frenchman," "Chinaman."—*Hearth and Home.*

APPARATUS FOR DETERMINING SPECIFIC GRAVITY.

DR. G. E. MOORE suggests, in the *Journal für Praktische Chemie*, a very ingenious device for determining specific gravity, which, as it may be serviceable to others in similar cases to the one which rendered it necessary, is here produced. The substance operated upon was the black precipitated sulphide of mercury, and as it possesses



the unpleasant peculiarity of retaining with great tenacity a coating of air, a complete mixture with water was found to be impossible. The use of the air-pump was also attended with difficulty from the foaming which ensued. To meet the difficulty, the device shown in the accompanying engraving was contrived. This consists of the ordinary specific gravity flask, *a*, which is connected with the Bunsen pump by means of the bulbed tube, *b*, whose middle part had been widened out into a bulb of equal capacity with the flask, the communications between the bulb tube, which is filled to about three-fourths with water, and the flask being made air-tight by a moist rubber collar. As soon as the manometer of the air-pump indicates the maximum of rarefaction, the apparatus is inclined, whereby the water runs gently from the bulb into the flask, penetrating every pore of the mass without forming a particle of scum.

The Celebrated Faber's Pencil Factory Destroyed.

SHORTLY after 2 o'clock A.M. of the 29th ult. a fire broke out in the four-story brick building at the foot of East Forty-second Street, occupied by Eberhard Faber as a lead-pencil factory. The efforts of the firemen were unavailing to save the building, and before the flames could be checked the structure was completely destroyed with its contents. The flames also extended to several extensive piles of cedar logs in the open space surrounding the factory, and a large number were damaged and destroyed. The loss of Mr. Faber is estimated at $200,000 on stock, machinery, etc. He is insured for $154,000.

The building, which was 100 feet square, was valued at $50,000; insured for $41,000.

The factory destroyed was the largest one of its kind in the United States, and there were nearly 300 workmen employed. The men are, of course, thrown out of employment for the present. The fire is supposed to have been caused by spontaneous combustion among some sawdust which had become saturated with oil from the machinery.

Thus another warning is added to the many on record against carelessness in the accumulation of rubbish about manufacturing establishments, a not only slovenly but a dangerous practice.

LAW CASE.

Suit in a State Court on a License under Sewing-machine Patents.

COMMONWEALTH OF MASSACHUSETTS, SUPREME JUDICIAL COURT, NORTHAMPTON, HAMPSHIRE COUNTY, MAY TERM, 1872.

[*Before Judge Ames.*]

The Florence Sewing-machine Company vs. *The Singer Manufacturing Company, The Wheeler & Wilson Manufacturing Company, and the Grover & Baker Sewing-machine Company.* — The defendants, known to those familiar with the sewing-machine trade as the "sewing-machine combination," have for several years been the owners of all the more important patents for sewing-machines, and still own all the patents which are indispensable to the manufacture of a practical sewing-machine. In the year 1868, they were owners of the re-issued patents of A. B. Wilson, dated respectively Jan. 22, 1856 and Dec. 9, 1856, for what is known in the trade as the "scratch" feed, and the patent of W. P. N. Fitzgerald, assignee of A. B. Wilson, dated Dec. 19, 1854, for what is known as the "four-motion" or "drop" feed, which patents have since expired.

On Feb. 20, 1868, these defendants granted to the Florence Sewing-machine Company a license to use in the machine made by that company, the above and other patents owned by them, at a patent rent of five dollars per machine for every machine made for use in the United States, and two dollars for every machine made for exportation; but a proviso was inserted in the license to the effect that no other license for a "drop-feed shuttle sewing-machine" using two threads should be granted by the licensers under the said patents at a less patent rent per machine without a corresponding reduction to the Florence Company. On Oct. 1 of the same year, the defendants granted to the Davis Sewing-machine Company a license to make fifty thousand machines of a certain pattern for the sum of twenty thousand dollars, being at the rate of forty cents per machine. The Davis machine is a shuttle machine having a peculiar feed motion. Its needle operates like the needle of what is called a "needle feed" sewing-machine, but it also has what the patentee Job A. Davis called in his patent a "helper," consisting of a toothed bar arranged above the cloth plate, and operating upon the upper surface of the cloth with a feeding action substantially like that of the "four motion" or "drop" feed. The plaintiffs allege that the Davis machine is a "drop feed shuttle machine," and that they are therefore entitled to a reduction of their patent rent to forty cents per machine, and this suit is brought to recover back from the defendants the sum of nearly forty thousand dollars, being the difference between the amount paid by plaintiffs to the defendants at the rates of five dollars and two dollars respectively for each machine, and the amount which they would have been required to pay, at the rate of forty cents per machine, for every machine made from Oct. 1, 1868 up to some time in 1869 when the plaintiffs first claimed the reduction. A suit in equity was commenced by plaintiffs on Dec. 30, 1869, in the Supreme Judicial Court of Massachusetts at Boston, to restrain the defendants from serving upon plaintiffs the notice necessary to terminate the license, and this injunction was granted to remain in force until the rights of the plaintiffs and defendants could be determined by a suit at law. This is the suit now reported.

The main question at issue in this suit was whether the Davis machine was a "drop-feed" machine within the meaning of the terms of the above-mentioned proviso of the license from defendants. The plaintiffs contended that what was called in the Davis patent the "helper" was the principal feeding device, and that it was essentially a "drop-feed," having substantially the same parts and the same operation as those described and claimed in the Fitzgerald patent, and as the "feed-motion" or "drop" feed used in the Florence, Wheeler & Wilson, Grover & Baker, Wilcox and Gibbs, and other machines in the market, and that the position above or below the cloth was immaterial. The defendants contended that the needle of the Davis machine was the principal if not the only feeding instrument of that machine, and that, if the "helper" did any of the feeding work, it was not a "drop" feed such as was understood in the trade by that term at the time of the granting of the Florence Sewing-machine Company's license. Eighty-two witnesses, including Messrs. E. S. Renwick, Harvey Waters, J. Boyd Elliot, S. P. Kittle, and Henry T. Brown, professional experts, as well as the presidents and principal officers of most of the leading sewing-machine companies, and many practical sewing-machine men, were examined, thirty-five of these being called by the plaintiffs, and forty-seven by the defendants. The trial lasted from the 20th to the 30th of May, the testimony occupying nearly eight days.

The jury found a verdict for the plaintiffs for the full amount claimed.

Counsel for plaintiffs, A. L. Soule, Esq., of Springfield, Mass., and Hon. E. R. Hoar, of Boston, ex-Attorney-General of the United States. For defendants, E. Merwin, Esq., and J. G. Abbott, Esq., of Boston, and S. J. Gordon, Esq., and George Gifford, Esq., of New York.

Railroad Torpedoes.

WILLIAM HUNTINGTON, a contributor to the *Railroad Gazette*, in a recent article speaks of railroad torpedoes as follows:—

One of the neatest and most effective little arrangements ever invented for convenience and safety in railroad operations is the "torpedo" or alarm signals. This little affair consists of a tin box about the size and shape of the smallest-sized blacking-boxes. The box is filled with an explosive compound, and two strips of tin are soldered to two opposite sides of the box perpendicular to its sides or edges, for fastening it to the rail. These boxes explode on the principle of the percussion-cap, with a loud report. They are in use on some roads for night signals and in foggy weather, when lights or flags would not be seen in time to prevent accident. Track-men are provided with these torpedoes, and in case of danger they are placed on the rail, far enough from the place of danger to prevent disaster. Usually three of them are placed a few feet apart, to insure their being heard by the engineer. They are reliable, and will explode at the touch of the wheel at the slowest speed.

It is said that the Reading Company uses 35,000 of these torpedoes per annum on the roads which it operates. This is a good showing in favor of the contrivance, and doubtless many serious accidents are prevented by their use. They cost but a trifle, and, considering the time they have been in use (the writer used them 20 years ago), it is singular that they are not more generally used.

They would be especially valuable at this time of the year, when bridges, culverts, and embankments are suddenly undermined or washed away, or rocks and earth are suddenly precipitated upon the track by the action of frost and the spring rains.

Every track-man should be provided with the torpedoes, and they are equally valuable for trainmen to use in case of accident, to prevent other trains running into the wrecked train, which frequently happens. Some genius might do a good thing by contriving a plan by which a torpedo could be placed on the rail at drawbridges and switches in case of misplacement. This could be accomplished by attaching suitable mechanism to the draw or switch for actuating a wire or rod, the length of which should be sufficient to give time to stop without danger. When the draw or switch is replaced, the torpedo could be removed by the reverse action of the mechanism as the draw comes back to place. The principal objection to contrivances of this kind is that they are easily tampered with by evil-disposed persons. This, however, should not be regarded as a serious objection, for a person bent on the destruction of a train will accomplish it in some way or other, and this torpedo signal can be so arranged that any meddling with it could be detected at once.

Curious Phenomenon of Recurrent Vision.

IN the course of some experiments with a new double-plate Holtz machine, says Prof. Young, of Dartmouth College, in the *American Journal of Science*, I have come upon a very curious phenomenon which I do not remember ever to have seen noticed. The machine gives easily intense Leyden jar sparks from 7 to 9 inches in length, and of most dazzling brilliancy. When, in a darkened room, the eye is screened from the direct light of the spark, the illumination produced is sufficient to render everything in the apartment visible; and what is remarkable, every conspicuous object is seen *twice* at least, with an interval of a trifle less than a quarter of a second—the first time vividly, the second time faintly; often is seen a third, and sometimes, but only with great difficulty, seen a fourth time. The appearance is precisely as if the object had been suddenly illuminated by a light at first bright, but rapidly fading to extinction, and as if, while the illumination lasted, the observer were winking as fast as possible.

I see it best by setting up in front of the machine, at a distance of 8 or 10 feet, a white screen having upon it a black cross with arms about 3 feet long and 1 foot wide. That the phenomenon is really subjective, and not due to a succession of sparks, is easily shown by swinging the screen from side to side. The black cross, at all periods of visibility, occupies the same place and is apparently stationary. The same is true of a stroboscopic disk in rapid revolution; it is seen several times by each spark, but each time in the same position. There is no apparent multiplication of a moving object of any sort.

Measuring roughly the interval between the

successive instants of visibility, in my own case the mean of twelve experiments gave 0·22 seconds as the interval between the first and second seeing of the cross upon the screen; separate results varying from 0·17 to 0·30 seconds. Another observer found a mean interval of 0·24 seconds.

Whatever the true explanation may turn out to be, the phenomenon at least suggests the idea of a *reflection of the nervous impulse* at the nerve extremities, as if intense impressions upon the retina, after being the first time propagated to the brain, were there reflected, returned to the retina, and from the retina traveling again to the brain renewed the sensation. I have ventured to call the phenomenon "recurrent vision."

It may be seen with some difficulty, by the help of an induction-coil and Leyden jar, or even by simply charging a Leyden jar with an old-fashioned electrical machine, and discharging it in a darkened room. The spark must be at least an inch in length.

Locomotive Report.

The following figures, communicated to the *Railway Times*, show the result of locomotive performance on the Cleveland, Columbus, and Cincinnati Railway, 397 miles, for the month of March, 1872 :—

(ALL DIVISIONS.)

Miles run by passenger trains	53,222
" " freight "	201,346
" " other "	67,446
Total mileage	322,014
No. of miles run to 1 pint of oil	23·23
" " 1 tun of coal	40·52
(Miles run with coal, 158,018.)	
Cost per mile run for repairs	4·15
" " " " " stores	·55
" " " " " fuel	7·40
" " " " " E., F., and W	7·10
Total cost per mile run	19·20
Total pints of engine oil used	8,027
" pounds of tallow "	3,693½
" pounds of waste "	1,951
" quarts of oil "	1,928½
" tuns of coal "	2,461

Copper Mining on Lake Superior.

A correspondent, writing over the signature of "Habitate" to the *London Mining Journal*, says the Americans seem to be a very excitable set, hence the condition of mining on Lake Superior for the past twenty years. There are mines here which by a small outlay of capital could be brought into a profitable state, paying from 15 to 30 per cent. profit; but the companies carried on their works under such outrageous management, putting up piles of useless machinery and buildings, and opening their mines in such a wretched way, that they could not possibly make them pay. And, notwithstanding the very favorable appearance of many of them, the companies seem to entertain the idea that they cannot be made to pay, judging from their past management. Yet I suppose, from the very favorable position of the copper market, some of them will be induced to make further trials. I should be most happy to see an English company take hold here, and see what can be done under good, sound management. Some time since the Douglass Houghton mining property was bought by gentlemen in Chicago, who would have gone into mining here in earnest, and, doubtless, would have run a railroad through the mineral region; but, unfortunately, they were put on one of the worst locations for making a mine that possibly could be. They put up steam-stamps where they had ample water-power, put up hoisting engine, etc., and were told they would have a paying mine at such a time, and previously that so much copper per month would be realized; but the truth of the matter was so different that they got quite disgusted, and sold the machinery and stamps for a mere trifle. But there are half a dozen mines in Ontonagon which with from $10,000 to $50,000 more outlay could be brought into a sound dividend state, paying 15 to 30 per cent. profit.

What "Habitate" says with regard to Octonagon is also applicable to Houghton and Keweenaw Counties.

Industry at Wilmington, Delaware.

This town is fast becoming celebrated for its business enterprise and increasing industries. Recently, E. C. Stotsenburg & Son, of that city, manufactured a condenser weighing over 28,000 pounds, and there can now be seen at the shops of E. & A. Betts, also of that city, a bed-plate for one of their large planing machines of very nearly the same weight. Castings of 20,000 pounds and upwards have frequently been made there recently. The planer alluded to, when finished and complete, will plane fourteen feet wide, ten feet high, and eighteen feet long, and will weigh nearly one hundred thousand pounds. It is being made for the Scott Foundry, Reading, Pa., and its first work will be on the eight great condensers for the four large steamers building by W. Cramp & Sons, of Philadelphia, for the Pennsylvania Railroad Company.

Sawdust Brandy.

In the current monthly report of the Commissioner of Agriculture, it is announced that there is an immense waste of material in our saw-mills, where the sawdust is thrown away; and that it is possible to produce from this dust a good quality of brandy. It is suggested that the sawdust of pine and of fir timber be mixed, and that a compound be prepared composed of nine parts of moist sawdust, 33·7 parts of water, and one part of hydrochloric acid, making 43·6 parts altogether. These are to be boiled under steam pressure eleven hours, when it will be found that nineteen per cent. of the mass will be grape sugar. The acid is to be neutralized with lime, and the mash supplied with yeast. After ninety-six hours' fermentation, a distillation of the mash will produce sixty-one quarts of brandy of fifty per cent. strength, and free of any smell of turpentine. It is claimed that in all probability many other woods than pine and fir will prove even better adapted to the production of brandy.

We should judge that this decoction might make a very delightful beverage, fully equal to any of the numerous preparations known as stomach bitters.

The Words we Use.

It has been calculated that our language, including the nomenclature of the arts and sciences, contains 100,000 words; yet, of this immense number, it is surprising how few are in common use. To the great majority, even of educated men, three-fourths of these words are as unfamiliar as Greek or Hebrew. Strike from the lexicon all the words that are nearly obsolete—all the words of special arts or professions—all the words confined in their usage to particular localities—all the words which even the educated speaker uses in only homœopathic doses — and it is astonishing into what a Liliputian volume your Brobdignagian or Webster or Walker will have sunk. It has been calculated that a child uses only about one hundred words; and, unless he belongs to the educated classes, he will never employ more than three or or four hundred.

A distinguished scholar estimates that few speakers or writers use as many as ten thousand words; ordinary persons of fair intelligence, not over four thousand. Even the great orator who is able to bring into the field in the war of words half the vast array of light and heavy troops which the vocabulary affords, yet contents himself with a far less imposing display of verbal force. Even all-knowing Milton, whose wealth seems amazing, and whom Dr. Johnson charges with using "a Babylonian dialect," uses only eight thousand, and Shakespeare himself, the "myriad-minded," only fifteen thousand.

Fall River a Rival to Lowell.

The *Commercial Bulletin*, Boston, publishes a long article upon what Fall River, Mass., is doing, which gives an exhibit of the remarkable progress of that industrial center. From this article we make the following summarized statement:—The number of companies engaged in cotton manufacturing, previous to November, 1870, was sixteen, employing a capital of $4,500,000, running 525,000 spindles, 14,200 looms, and furnishing employment to over 6,000 operatives. Besides these were two print works, four thread manufactories, and a woolen mill, which would swell the capital employed in the above different branches to nearly $5,500,000. Since the period named twenty new mills have been projected, some of which have gone into operation, and nearly all of which are under way. When these are all completed, Fall River can boast of thirty-six cotton mills. At present there are one hundred and twenty-eight cotton mills in the State.

The Workers and the Drones.

Because "it is not the *active* man who employs labor, nor the diligent worker in any laudable enterprise, whose interests are antagonistic to those of the laborer; but the idler, who consumes extravagantly and produces nothing," the New York *Mercantile Journal* makes the following proposition the fourth article of its epitomized financial and commercial platform:—"We hold that all persons whose energies are not employed in producing or facilitating the exchange of commodities, or in advancing science, art, or morality, are moths in the community. The idler and spendthrift is far less worthy of consideration than the hard-working miser."

This is what a wise friend of ours has chosen to style "concentrated common sense," a phrase that so exactly expresses our opinion that we will not add another word to it.

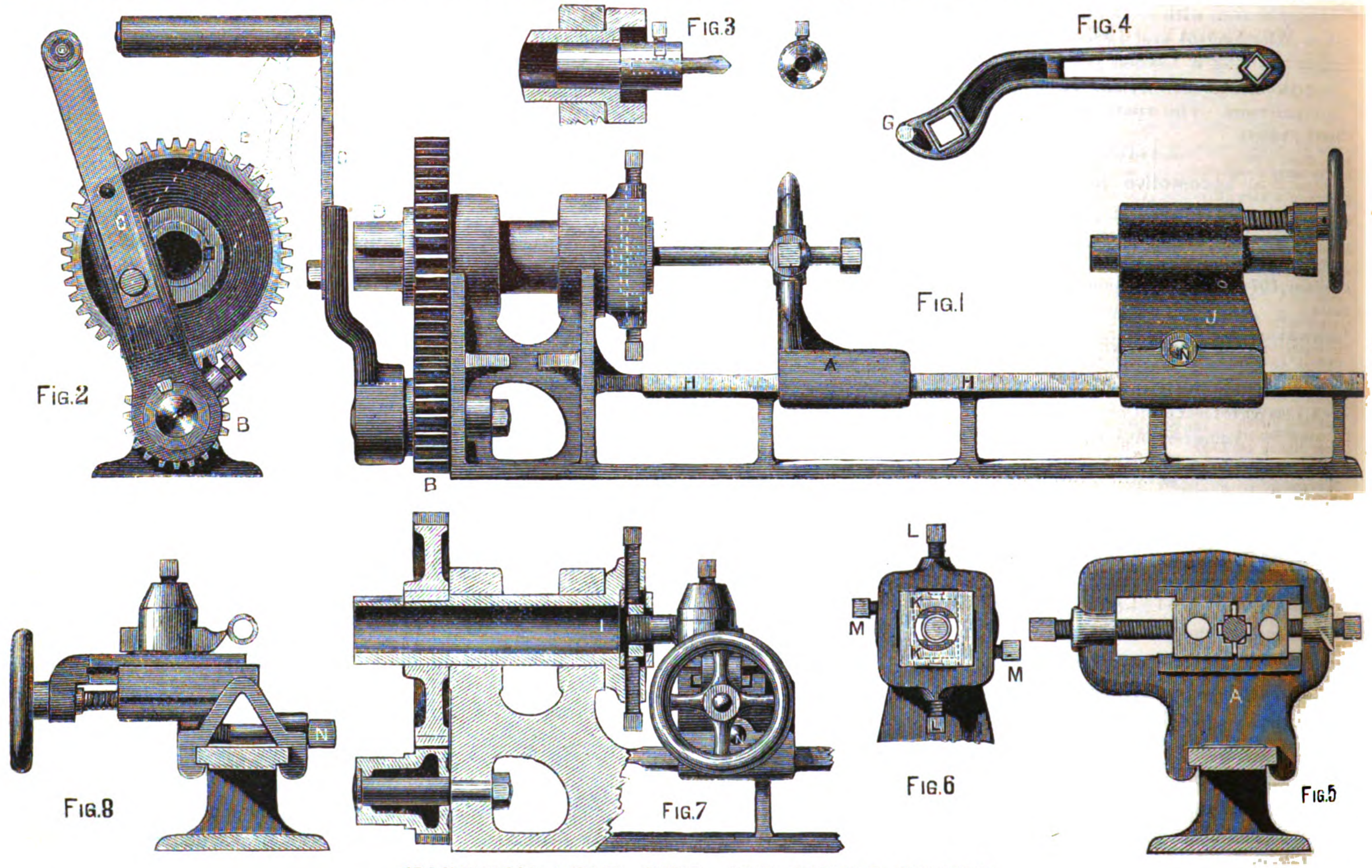
Sewing-machine sales in 1871 :—

The Singer Mfg. Co	Sold	181,260	Machines.
Wheeler & Wilson Mfg. Co	"	128,526	"
Grover & Baker S. M. Co	"	50,838	"
Weed S. M. Co	"	39,655	"
Howe Machine Co. (Jan. 1 to July 1)	"	34,010	"
Willcox & Gibbs S. M. Co	"	30,127	"
Wilson S. M. Co	"	21,153	"
American B. H. O. & S. M. Co	"	20,121	"
Original Howe S. M. Co	"	20,051	"
Florence S. M. Co	"	15,947	"
Gold Medal S. M. Co	"	13,562	"
Davis S. M. Co	"	11,568	"
Domestic S. M. Co	"	10,397	"
Finkle & Lyon Mfg. Co	"	7,639	"
Ætna S. M Co	"	4,720	"
Blees S. M. Co	"	4,557	"
Elliptic S. M. Co	"	4,555	"
Empire S. M. Co	"	2,965	"
Parham S. M. Co	"	2,056	"

To protect Walks from Weeds.—Take one gallon of gas-tar and about half a pound of air-slacked lime, boil and incorporate them well together and apply the mixture with a common long-handled whitewash brush. This will dry in a few hours if put boiling hot, and will kill off all young weeds and prevent their growth.

Manning's Bolt, Pipe, and Nipple Cutter.

THIS machine supplies a want long felt in the manufacture of pipes, bolts, etc., namely, a cheap, convenient, and efficient tool for drilling, cutting threads in bolts and piping, tapping nuts, and making nipples, for which it is in every respect admirably adapted. It is a veritable *multum in parvo*, which will well repay examination by any blacksmith, machinist, or pipe-worker who desires to invest his money to the best advantage in the outfit of his shop. It is also an excellent tool for railway repair shops, and will in use justify the encomium we have bestowed upon it. It is intended for use on a bench, where it can either be worked by hand or be driven by power. It will



MANNING'S BOLT, PIPE, AND NIPPLE CUTTER.

cut threads on one-inch pipe, and on one-and-a-quarter inch bolts, or smaller sizes. It is manufactured in the best manner possible; the parts are lined up, and made perfectly true to a template, each piece fitting any machine. All set-screws are turned steel, and the jaws tempered malleable iron and steel. Its weight is one hundred and forty five pounds.

Power may be applied either by the crank, which may be attached to the shaft of the pinion, B, or to the spindle, D, Fig. 1. The dotted lines, E, Fig. 2, represent a lever and pawl, which may be used when more power is required than can be applied by the crank.

Fig. 1 shows a side view of the machine, as arranged for cutting a bolt or pipe, which is held and centered by the jaws in the head, A, Figs. 1 and 5. The cutting-die, shown at F, is revolved around the bolt or pipe, insuring a uniformly cut thread, and the strain being steady, there is less liability of splitting pipe than when the stock and die is used.

The head, A, is forced up toward the cutting-die by the lever, Fig. 4, which has a stud or fulcrum at G, which is inserted into holes in the bed-plate, H, not shown in the engraving.

For revolving pipe to cut off nipples, the jaws, K K, Fig. 6, are inserted in the spindle-head at I, Fig. 7, and are held in place by the screws, M M, and clamp the pipe by means of the set-screws, L L. The cutter-head, Figs. 7 and 8, may now be used in the same manner as on an ordinary lathe. It is secured to the bed-plate at any point by the binding-screw, N.

Fig. 3 shows a drill-chuck, which is inserted into the hollow spindle at I, Fig. 7. The tail-center, J, is secured on the bed-plate in the same manner as the cutter-head, and is used to give the feed to the piece being drilled. This arrangement may also be used for centering.

Fig. 4 shows the lever, which may be used also as a wrench; it is made of malleable iron.

If preferred, pipes or bolts may be clamped in the jaws, Fig. 6, and open or solid dies used in the head, A, Figs. 1 and 5. At convenience taps are held either in the head, A, or in the jaws, Fig. 6. This machine was patented April 23, 1872 Further information may be obtained from the manufacturers, W. L. Chase & Co., 93, 95, and 97 Liberty Street, New York.

Lead in Oregon.

THE Portland *Oregonian* says:—Several specimens of lead ore, discovered near the foot of the Cascades in Linn County, have been sent to this city for analysis by J. H. Fisk, assayer. From him we learn that after testing the ore he found it to contain about 60 per cent. of pure lead, and also a very fair proportion of silver. According to the results of the assay, 2,000 pounds will produce 1,200 pounds of lead, and average $18 in silver. This is regarded as a very generous yield of these metals. This mine is of recent discovery. It is known as the Washington Lode. A joint-stock company has been lately incorporated in this city for the purpose of engaging in the development of these valuable mines. Mr. Fisk informs us that almost inexhaustible quantities of this same ore, with all the indications of as bounteous a yield of the same metals, have been discovered in the vicinity of Tillamook.

Captain Corno, of the Mila Bond, has contracted to bring over on his return to this city a large quantity of this ore. It will be analyzed here, and, if attended with satisfactory results, run into bars and sent to Europe. All these things demonstrate the fact that Oregon abounds in all the rich mineral stores which are essential in building up and developing one of the most promising States in the Union. Capital and men of energy and enterprise are what is wanted to reveal and turn into profitable channels these latent sources of a State's permanent wealth.

LUMBER IN MAINE.—The operations of the past winter were more extensive than ever before known. The total product of the State, as near as can be estimated, of the cut of logs, is 700,000,000 of feet. Of this amount the Kennebec lumbermen have cut 110,000,000 logs, the largest ever cut. The Penobscot lumbermen have cut at least 225,000,000 feet. Most of the timber product is spruce. An intelligent lumberman says that within five years the supply of pine will be exhausted. In the operations of the past winter at the head waters of the Kennebec there were cut some 20,000,000 feet of pine, while the Penobscot lumbermen cut some thirty to forty millions of feet.

AMERICAN ARTISAN

BROWN & ALLEN, Publishers,

ISSUED WEEKLY AT

No. 189 Broadway, New York.

H. T. BROWN. L. ALLEN.

AGENTS.

AMERICAN NEWS COMPANY, New York City; NEW YORK NEWS COMPANY, New York City; NEW ENGLAND NEWS COMPANY, Boston; A. WINCH & Co., Philadelphia; H. TAYLOR & Co., Baltimore.

WEDNESDAY, JUNE 5, 1872

CONTENTS OF THIS NUMBER.

[Illustrations are indicated by an asterisk.]

CANADIAN PATENT LAW AMENDMENT.

WE learn that there is every probability of the passage of the amendment of the patent law of Canada, to which we referred on pages 313 and 329 of the current volume of the AMERICAN ARTISAN, and which provides for the obtaining of patents in the Dominion by American citizens residing at home. We are informed that there is also a probability of the modification of the objectionable clause relating to publications, on which we remarked on page 329. Should the bill now before parliament become law, as is expected, on or about July 1, we shall be ready to make and prosecute applications at once, having made very advantageous arrangements with one of the oldest and most reliable Canadian patent agencies.

SCIENCE AND COMMON SENSE.

UNDER this heading *Hearth and Home* narrates how some villagers, rejecting the assistance of scientific engineers in the construction of their water-works, came to grief, which is quite probable, and which, according to the journal referred to, "shows how much more science is worth than common sense when applied to difficult matters of engineering."

Then it goes on to tell how a break in a dam occurred which scientific engineers did not know how to stop, but which an unscientific "plain man" (are all plain men unscientific?) stopped in a short time, showing "how much more common sense is worth than science when applied to difficult problems of engineering."

Paradoxes are a prominent feature of the Partonian style of literary performance.

The fault in the first story is that the supplying of a country village is not usually "a difficult matter of engineering," and of the second, that scientific engineers can generally stop a break in a dam as effectually as "plain men," and are usually pretty well stocked with that homely article called common sense. The trouble is that the majority of people cannot discriminate between scientific and unscientific men who style themselves C.E. or M.E., as the case may be. They suppose that these letters appended to a man's name mean great scientific acquirements, and truly they ought to have that meaning.

Unfortunately, however, they are too often the assumption of quacks, destitute of either science or common sense. On the contrary, many a man who writes his name as simple John Smith, or Horace Jones, has both in ample quantity to meet such an emergency as watering a village or stopping a hole in a dam. So when "plain men" like Smith or Jones succeed, when Quack C.E. or M.E. fails, the indiscriminating cry out, Common sense is better than all the science in the world, and hold in contempt all the C.Es. and the M.Es.

The truth is, dear reader, that science includes common sense. That is the rock upon which the whole superstructure of real knowledge rests, whether it be of law or logic, mechanics or medicine. To acquire knowledge worthy the name, one must have common sense. A parrot without common sense learns to talk, but not to use language scientifically.

So we have a great many people who have learned the language, and formulated expressions of science, but who are no more really scientific than the parrot is a rhetorician.

The remedy for the intrusion of such quacks into the ranks of any respectable profession lies in the action of the profession itself; and the fact that so many pretenders flourish shows that the engineering profession in this country fails to exert that unity of action in refusing to recognize those who should find no place in it, which, if exerted, would soon draw a broad line of demarkation between the qualified and the incompetent.

WASHING OUT LOCOMOTIVE BOILERS.

THE "Report of the Committee on Boilers and Boiler Materials," on page 17 of Fourth Annual Report American Railway M. M. Association, contains the objections to blowing off boilers, and allowing them to cool before washing out.

As the heat retained in the boiler after blowing out bakes or hardens the mud or other deposit, a proper method is to blow off steam, and, after the pressure is off the boiler, to run in *cold* water, while *hot* and impure water is run off, thus gradually cooling the boiler until it is cold, after which time washing out with cold water will not injure it. This is the method practiced by Mr. Charles Graham, of Kingston, Pa., M.M. of the Lackawanna and Bloomsburg R.R.

To fill the boiler again, he uses a large injector attached to the boiler in the pump-house, with a pipe running from the injector into the engine-house, conveniently placed to attach to the feed-pipe of the engine. If the boiler is cold, he begins to fill with *cold* water, and, by graduating the supply of steam as the boiler fills, it as gradually becomes hot from the vapor. This can readily be felt by placing the hand on the boiler. In this manner he fills the boiler with *warm* water, and gets up steam in a very short time.

Locomotive boilers are sometimes allowed to run too long without being washed out, and generally for good reasons, as, for instance, the lack of motive power, in which case they cannot be spared long enough for this purpose.

If the injector is large enough, the boiler can be washed only with *warm* water and need not be cooled off. Mr. Graham informs us that he has got up steam (after filling in this manner) in 18 minutes, with steam enough to raise the whistle-valve in 21 minutes, and the engine could have been run out of the engine-house in about half an hour after firing up. He thinks an engine can be washed out in this way with a delay of not more than 3 to 4 hours.

THE MARCH OF THE MOTHS.

YEAR by year the ravages of insects seem to increase. How then? Insects must eat to live, and if they live they will eat. The *Prairie Farmer* states that in no former year was there so much complaint of damage by insects as last year. Thus that journal complains:—

"The codling moth, canker-worm, and the various curculios in orchards and fruit gardens; the Colorado beetle swarming on the potato vines everywhere; the chinch-bug in wheat, corn, and oat fields; the cicada or seventeen-year locusts, here and there in various localities by the million. It is getting to be about as much work to fight the insect enemies of our fruits and cereals as it is to cultivate and harvest them. Weeds, Canada thistles, ox-eye daisies, quack grass, anything in that line would be freely exchanged for by our orchardists and farmers, now the unfortunate possessors of myriads of destructive insects. What is to be done? Shall we call upon the entomological scientists, or are they unable to go beyond names, descriptions, habits, and present remedies? Curculio catchers, curculio traps, Paris green—the supply now almost exhausted—have done good work, but yet the hordes march on in their destructive invasion! The situation is not far from discouraging. Oh! for some modern St. Patrick, with enlarged powers, to drive these foes from the country!"

A St. Patrick would indeed be a boon to our Western agriculturists, but it is quite improbable that he will arise. The next best thing for those suffering from this plague is to study the compensations of nature.

"The sun drinks the sea, the earth drinks the clouds, the ocean drinks the rivers; everything in heaven and earth drinks, therefore why should not I drink?" This is, we believe, a specimen of Oriental logic in defense of dram-drinking. Let the inhabitants of the insect-devoured regions adopt a similar style of reasoning. "The plants eat the earth, the insects eat the plants, something or other lives that will eat the insects, which, after they are eaten, will trouble us no more."

To apply this reasoning intelligently to practice requires more knowledge than is at present generally possessed by the moth-beset farmers. If they knew it, there is no science of more importance to them than the natural history of insects. To fight these minute pests, we must know their habits and their natural enemies. We must make the latter our allies, and, if we have to pay something for their help, we should remember the laborer is worthy of his hire. Many a farmer has begrudged the robins the few cherries for which their services in destroying insects would have been purchased cheaply, and has driven them away with hideously contrived combinations of old boots, rags, tin scraps, and even the more cruel gun, ignorant that these and others of the feathered race were his best friends. It is the old story.

Through ignorance mankind has always persecuted those benefactors whose good works they could not comprehend.

THE FILTHY STREETS OF NEW YORK.

WE cannot recollect a time in the dirty annals of neglected street-cleaning when certain quarters of this great city were in a more disgusting state than at present. As we do not wish to turn the stomachs of our rural readers not tortured into toleration by familiarity with filth, we will not enumerate the noisome smells and their sickening sources which reek and rot in all the more crowded portions of the city. Broadway is kept tolerably clean, and so are the other most fashionable thoroughfares; but in many of the alleys and tenant-house localities, and around Fulton and Washington Markets, a concentration of mixed nastiness exists, scarcely excelled by what the traveller may meet with in the lower quarters of a Chinese city. Common denunciation heaps blame upon the head of "Brown," the Street Contractor. Controller Green will not pay Brown, whose men consequently remain unpaid, for the simple reason that Mr. Green is unauthorized to pay. He remains unauthorized because it is thought that the aforesaid Brown has not made proper use of the money already paid him, and that he, by pleading inability to pay, and encouraging the men to clamor against the Controller, is desirous to cover his own culpability.

We have nothing to say in favor of the Street Contractor, who, to say the least, knows how to make the expenditure of public money accomplish as little as any of his predecessors. But the blame does not rest altogether with him. The police allow the most shameless disregard of city regulations in regard to the use of the streets. Incumbered sidewalks, carts backed up to the doors of buildings, in total disregard of the rights of foot passengers, are almost the rule in the busy parts of the city. Decayed fruit, offal from the markets, ashes, and other detestable rubbish, are recklessly dumped into the streets, and in the hot sun immediately begin to "smell to heaven." All these nuisances, and others for which polite names do not exist, are committed under the very eyes and noses of the guardians of the public peace, without apparently attracting the least attention from these knights of the club.

If pestilence visits us this summer, there will be no want of preparation for a harvest of death. We wish these blue-coats could be rolled in the filth which their negligence fosters, and that the street contractor might be compelled to clean them in person, repeating the dose as often as necessary to stimulate their optics and olfactories into the proper performance of their duties.

INCENDIARY MATCHES.

IT has come to our knowledge that recently, in a large retail establishment in this city, a lady had her dress set on fire by stepping upon a match and thus igniting it. This match was of a kind called "parlor matches," but, there being more than one kind of match sold under this name in the market, we are unable to say whether the incendiary match was in this instance the genuine article or a fraudulent imitation.

It occurred with us, the other evening, that, in lighting one of these matches, which ignited with an explosion almost like that of a percussion-cap, a portion of the ignited tip flew off and burned a hole in a valuable table-spread.

Not long since we saw a bundle of papers fired by one of these incendiary matches, the papers having been loosely strewn upon the floor, and the match having been dropped and stepped upon.

That none of these accidents resulted in serious injury is no argument in favor of the use of explosive matches. The tips of these matches are chiefly composed of chlorate of potash and phosphorus, mixed with something that diminishes the force of the explosion of these substances when they unite suddenly under friction. There is often a surplus of the material, which, when the match is struck, breaks off, as in the case above cited, and becomes a flaming spark ready to ignite any very combustible thing it may fall into or upon.

The only thing these matches have to recommend them is their freedom from disagreeable odor. They easily become injured by dampness, and then are a source of disappointment and annoyance. The safest and best match yet used is the common sulphur and phosphorus tip match. The others are dangerous, and the insurance companies should prohibit their use.

SEWING-MACHINE LITIGATION.

ON another page of this issue will be found a report of a suit at Northampton, Mass., by which the Florence Sewing-machine Company obtained a verdict for over $30,000 against the Singer, Wheeler & Wilson, and Grover & Baker Companies. We learn that other suits are pending between the same parties, involving similar points, with claims amounting in the aggregate to $150,000.

LETTER OF CHANCELLOR LIVINGSTON TO ROBERT FULTON.

WE are indebted to William Baxter, M.E., of Newark, N. J., for the copy of the letter herewith appended. It is from an autograph letter in the possession of Barstowe & Pope, Lord's Court, New York City.

It would seem a proper inference from the letter that Mr. Fulton had been advocating a railway project with the learned chancellor, whose numerous objections will amuse the modern reader. The breathless speed of four miles an hour with such heavy carriages as proposed seems to have discouraged one so accustomed to the slow progress of courts of chancery; but we cannot add to the interest of the letter by comment:—

ALBANY, March 1st, 1811.

ROBERT FULTON:

Dear Sir:—I did not till yesterday receive yours of February 26.

I had before read your very ingenious proposition as to railway communication.

I fear, however, on mature reflection, that they will be liable to serious objection, and ultimately more expensive than a canal.

They must be double, so as to prevent the danger of the two heavy bodies meeting.

The walls on which they are placed must be at least four feet below the surface, and three feet above, and must be clamped with iron, and then would hardly sustain so heavy a weight as you propose to move at the rate of four miles an hour on wheels. As to wood, it would not last a week. They must be covered with iron, and that, too, very strong and thick.

The means of stopping these heavy carriages without a great shock, and of preventing them from running on each other, as there will be many running on the same road, will be very difficult.

In case of accidental stops or necessary stops to take wood and water, many accidents would occur. The carriage of condensing water would be very troublesome.

Upon the whole, I fear the expense would be much greater than that of canals without being so convenient. Yours,

R. B. LIVINGSTON,
Chancellor State of New York.

AN ELECTRIC RAILROAD.

To New Orleans must be awarded the credit of the most striking proposition in railway propulsion, as to New York we give precedence in novel schemes for railways. In the latter city we have a railway on pillars, several underground projects, a Vanderbilt scheme, and a pneumatic railway, and a scheme for an endless traveling sidewalk. New Orleans has been experimenting with ammonia as a motive power, which late advices state has been abandoned by the inventor for compressed air; and now follows an account of an electric railway. As a hundred miles an hour is the predicted speed expected from this remarkable invention, it may be a little interesting to look at what that speed involves. First, it involves 533⅔ revolutions per minute for the driving-wheels, supposing them to be 16½ feet in circumference, or over eight revolutions per second. Then it involves resistance by the air of fifty pounds to each square foot of cross-section, and as, at one hundred miles per hour, three and three-fourths pounds draught is a horse-power, it would require three and one-third horse-power for each square foot of cross-section to overcome the resistance of the air alone, amounting, supposing the end of this car propelled by lightning to have an area of sixty-four square feet, to *eight hundred and fifty-three and one-third horse-power*.

One hundred miles per hour is one hundred and forty-six and two-third feet per second, a velocity equal to that acquired in falling three hundred and thirty-six and one-ninth feet.

A hundred miles an hour by an electric engine "is good." When will newspapers, which should be the instructors of the people, cease to be the vehicles of such arrant nonsense.

A CURIOUS CLAIM OF COPYRIGHT.

MR. ARTHUR PARTON, of this city, painted a picture some years ago, and sold it to a citizen of Connecticut, who sold it to a Boston buyer, from whom it was purchased by Prang, the widely known publisher and dealer in chromos, who subsequently had it reproduced in chromo. No restriction in regard to future use of the picture was made in any of its sales. Now, Mr. Parton claims that his painting is, in the purpose and meaning of the law, a manuscript, and that, under the Act of 1861, giving an author exclusive right in his manuscript, and prohibiting its publication by any one without the author's consent, he has a legal claim to copyright in his picture.

Parton's position is plausible, but we think it will be difficult for him to maintain it. When an author sells his manuscript to a publisher without restrictions, the latter justly supposes he has acquired the right to publish it where and when he pleases, and we think any court would decide that such act of sale was an implied surrender of the author's right to control the publication. A publisher does not merely purchase the paper upon which a manuscript is written; he pays a price for the brainwork of the author, which it is the sole purpose of copyright to secure.

Now, as Mr. Parton puts himself on the same plane with an author of a manuscript, we judge his chances of bleeding Mr. Prang are small. If he paints pictures that are valuable, people will think twice before purchasing them hereafter, if to lithograph them leads to litigation.

AMERICAN IMPLEMENTS IN AUSTRALIA.

The market for American agricultural implements is extending to Australia. A late Australian exchange states that the *Chattanooga* arrived at Melbourne on the 15th of December, a portion of her cargo being a collection of thill plows for surface cultivation, cultivators, and subsoil plows. These implements were ordered by the East Moreton Agricultural and Horticultural Society. The exhibition of this Society was to be held at Brisbane, where the implements were to be exhibited. The paper referred to speaks in high terms of the implements, and expresses the hope that their introduction will assist in removing the difficulties arising from scarcity of laborers.

The island—or we should rather say continent—of Australia is destined to become a most important center of civilization. We predict that at some future period, perhaps yet remote, it will become independent of the mother country as the American Colonies did, and in that distant though fertile land shall exist a powerful, intelligent, and enterprising nation. Climate, natural resources, geographical position, all confirm this belief.

It would not surprise us that ere many years a lively and important trade, not only in agricultural implements and machinery, but perhaps in other kinds of machinery, should grow out of this beginning.

STATUE OF SETH BOYDEN.

Our Newark friends are bestirring themselves in the matter of erecting a statue of Seth Boyden, to whose inventive genius the present prosperity of that thriving town is largely due. Our memories of this remarkable man are confined to his senile years, the weight of which he bore with the placidity of a philosopher and a Christian. It was a treat to converse with a man so ripe in experience, and so clear in the expression of his thoughts. Seth Boyden died a poor man in all except the respect of his fellow-men, and the rewards that follow a life well spent. One of these rewards is the proposed monument to his memory, and the citizens of Newark should see that it is erected.

SELF-OPENING AND CLOSING HATCHWAYS FOR ELEVATORS.

Accidents are constantly occurring from unprotected hatchways. We are cognizant of no less than three such accidents which occurred in this city during the month of May. Two of these resulted in loss of life, and the third in very serious injuries.

Not only is life endangered by the risk of falling through open hatchways, but also from the risk of being crushed by heavy bodies dropped through carelessness or breakage. We have, therefore, been much interested in inspecting the operation of automatically opening and closing hatchways in operation at Mr. Claflin's large wholesale store, corner of Church and Worth Streets, in this city.

This hatchway has been recently patented through the "American Artisan Patent Agency" by Mr. J. W. Osgood, of this city, and is now manufactured by Messrs. Osgood & Storer, 346 and 348 Broadway, New York. It is so constructed that the motion of the elevator carriage up or down opens the hatchway to permit the passage of the platform and its load, closing the hatchways immediately after its passage.

The precise means by which this is done cannot well be indicated without engravings, but they are extremely simple, and we see nothing about any of the parts which is not likely to be durable.

This invention is an absolute safeguard against any accident from the falling of persons or goods, and will well repay examination on the part of those who use or contemplate using elevators in their buildings.

Prof. Morse's Will.

The will of the late Prof. Morse has been admitted to probate. With the exception of specific legacies, his whole property is held in trust for the use of his wife, and will be divided at her death among seven children. The following legacies and bequests will be paid from the residuary fund:—Home of the Friendless, Poughkeepsie, $3,000; Nassau Hall, Princeton, to found two scholarships, to be named Finley and Breese respectively, $2,000; Union Theological Seminary, Hampden Sidney, Va., $1,000; Old Ladies' Home, Poughkeepsie, $1,000; National Academy of Design, New York, for "procuring a suitable medal for the encouragement of art," $1,000; American Geographical Society, a medal for the encouragement of geographical research, $1,000; New York City University Scholarship Medal, $1,000. The cross of the Knight Commander of the Order of the Dannebroge, conferred upon him by the King of Denmark, is to be returned to the Chancellor of the Order at Copenhagen.

Test of Life-boats.

A party of U. S. officials made a test of life-boats at the life-saving station between Neversink and Seabright, on Monday, May 27th. The weather, though squally, was not of the right kind for piling up great foam-crested ridges of surf, and the waves were accordingly somewhat too tranquil for a good test of the relative merits of the contestants. Before they were launched, however, the mortar was fired with the line, and sent it to a distance of 210 yards with a charge of only three ounces of powder. Two rockets were then fired, one the Lilliendahl, which has a complicated tripod arrangement, and is fired by a cap and trigger, and the Edge, which is fired off a common rocket crotch. Both sent the line about the same distance, 280 yards, but it is noticeable that the former had a charge of a pound and a half of powder, and the latter of four pounds of rocket composition. When these fireworks had been let off, and the ladies present had been sufficiently terrified by the bad behavior of the rockets, which were slightly eccentric in their course, the committee were ready to see the boats. The three wooden ones were all drawn up in a line, their prows in the water, and the crews with their hands on the gunwales, waiting for the word. When it came, they pushed off vigorously, jumped in, and rowed away as if for a wager, the bows of every one lifting beautifully over the surf. There was but little sea, and, if the life-saving institutions had no fiercer waves, no grander winds to contend with, then the boat from Squam, the *Sparkling Sea*, from Deal, and the Wrecking Company's boat, manned by Joe West, would be amply sufficient. But on this rude coast, where every mile has its memories of cruel wrecks, of men frozen to death in the icy riggings, of vessels hoisted right upon the lawns of country residences by the stupendous compact of the sea and air, something is wanted of sterner stuff. The iron life-boats were two—the automatic patented by Beaupre, built in Boston, and the *Rescue*, built by the Government on the lines furnished by Lieut. Stodder. By the common judgment of the seafaring men on the beach, the Beaupre boat was utterly unfit for the sea in her model, and her self-righting and self-bailing apparatus were unfit also for furious waves, being evidently constructed by some one who knew very little of the mad waters that range along our Atlantic coast. The Stodder boat was excellent in every respect, furnished with absolutely perfect self-righting air chambers, and in her contrivance for self-ballasting; but with a bailing apparatus that is capable of great improvement. She is furnished with reversing row-locks, a great convenience, and her lines are modelled upon the Greenlander's kyack. Being made very heavy below the water-line and light above, with abundant facilities for altering and controlling her weight, she is correct in principle. Being 2,000 pounds in weight, she is much too heavy; but a lighter boat exactly like her, and as strong, can be built on the same lines and with the same combinations. Even with her present imperfections, she is by far the best life-boat afloat. The Committee reserved their decision.

Awfully Explosive.—Mr. James Bruce writes, says the *Mechanics' Magazine*, "that, if the white strong heat of a galvanic battery be applied 'suddenly' to two ounces of wood ashes, or to three of coal ashes, the explosive force will be terrible beyond measure; but far more awful with 'calamine' *per se*, or in the following admixture:—Pit-coal ashes, 3 parts; wood ashes, 2 parts; manganese, 6 parts; calamine, 3 parts; fluate of lime, 1 part; mix well.

NEW AMERICAN PATENTS.

Under this head we shall give a weekly summary of the more important American and English Patents.

Lubricator for Sewing-Machines.—P. Held, Aurora, Ind. —*May* 21.—This is a compound of fine sperm oil, crude petroleum oil, spirits of turpentine, and oil of wintergreen, prepared in a peculiar manner, and for the purpose indicated in the title.

Treatment of Phosphates for the Manufacture of Fertilizers.—N. A. Pratt, Charleston, S. C., and G. T. Lewis, Philadelphia, Pa.—*May* 21.—This treatment consists, first, in grinding together crude phosphatic material, acid, and water, to obtain crude phosphoric acid, or phosphate of lime and other bases. The product is then pressed in bags to obtain the phosphoric extract. The phosphoric extract is then ground with lime, magnesia, or other base, in their salts, to obtain an artificial phosphate of lime or other phosphate. An adaptation of burrstones or other mill to grinding in acid and water any other material which requires to be thus ground and mixed, as a combined grinding and mixing machine, forms the subject of the fourth claim.

Preserving Iron.—W. H. Sterling, New York City.—*May* 21.—In this invention paraffine, either separate or in combination with any non-oxydizing or non-oxydizable substance or substances, is subjected to heat, and applied to the iron under pressure, which is claimed, during the expansion of the iron by heat, to saturate the metal with the protecting substance or compound.

Hydraulic Beton.—J. Drevet, Paris, France.—*May* 21.—This new hydraulic béton is called by its inventor *béton français*. It consists of sand, silex, earth or river mud, sea salt, and hydraulic cement, put together in specified proportions and by a peculiar method of preparation.

Use of Caseine for making Printer's Blocks.—T. J. Denne, Mile End, London, assignor of one-half his right to A. Hentschel, Islington, England.—*May* 21.—An admixture consisting chiefly of caseine and China-clay for the preparation of a printing block in intaglio or relief, directly from the negative, constitutes the first claim. Four other claims comprise the use of caseine and lampblack for the preparation of an artificial negative on paper; the preparation of paper by a composition composed of caseine, soap, and bichromate of potassa, by which drawings may be transferred to a lithographic stone or to a zinc surface; the preparation of a zinc surface by the use of caseine, soap, and lampblack; and the preparation of wood surfaces by the use of caseine, zinc-white, or white-lead, with the addition of chloride of ammonia.

Flexible Lip-formed Valve.—E. Field, Middlesex County, England.—*May* 21.—This is a valve for air-pumps, which consists of a flexible ring, having an annular seat at its outer edge, and a series of annular flexible lips arranged in pairs one above the other, each pair being in contact at the outer edges.

Water Tuyere for Forges.—J. Frearson, Birmingham, England.—*May* 21.—This is a combination of a water cistern with a water tuyere without the intervention of separate water-pipes for hot-blast. The air-chamber or air-pipes are situated over or under the forge or furnace fire for hot-blast, and the bottom part of the water tuyere is supplied with a movable nose part for hot or cold blast.

Flood-fence.—W. R. McFarland, Paris, Tenn.—*May* 21.—In this invention a water-gap is provided with a roller or drum mounted in a sliding gate, so that both gate and drum shall rise and fall with the water while the drum is rotated by the current to feed drift and other impediment through the gap.

Forming Stamped Articles of Sheet Zinc.—A. T. Perkins, asgr. of one-half of his right to N. Waterman, Toledo, Ohio.—*May* 21.—This invention consists in a process of tempering and stamping sheet metal, by heating the metal in oil or other suitable liquid as a preliminary to stamping.

Improvement in Cartridges.—J. W. Cochran, New York City.—*May* 28.—This invention consists in a cartridge which has for its component parts a shell, its charge, the ball, and a lubricating wad-cleaner arranged between the charge and ball, and composed of an elastic material or body charged with plumbago or lubricating material in a pulverulent state, whereby said wad-cleaner not only operates during its expulsion with the ball to clean out the bore of the gun, but also to lubricate and so facilitate the discharge of a succeeding ball, or, in other words, to keep the bore of the barrel in both a clean and slippery condition. This double function of the rod, whereby it acts both as a cleaner and lubricator, is effected in part by the yielding or elastic character of its body, and in part by the plumbago or other lubricating powder with which said body is charged, and which, unlike grease, has no corroding or injurious effect upon the ball or metallic shell of the cartridge.

Mechanical Movement.—H. H. Baker, Newmarket, N. J.—*May* 28.—This invention, which may be used for operating a drill and for various other purposes, consists in a novel combination of details and construction of parts, whereby a revolving driving-shaft is made to communicate rotary motion to a secondary shaft, in varied positions of the latter, both around the axis of the driving-shaft and at different angles varying from an obtuse to an acute angle relatively to the driving-shaft.

Device for locking Nuts.—P. L. Gibbs, Dunleith, Ill.—*May* 28.—This invention is especially designed for locking the nuts of railway fish-joints. It consists in the combination with the fish-plates or other plates used to form the joint, and the nuts of the bolts securing the plates, of malleable washers, which have ribs formed on their outer faces to fit grooves in the inner faces of the nuts, so that when their edges are tamped into a groove in the plates the washers are locked both with the plates and with the nuts, and the latter prevented from turning and working loose.

Improvement in Snap-hooks.—A. A. Hotchkiss, Sharon, Conn.—*May* 28.—This invention relates to that class of snap hooks in which the spring tongue is passed through the loops and bent over the back of the hook, and secured by a collar. This part of the invention consists in horns formed on the collar which secures the spring tongue in place, whereby said collar is clinched to the loop of the hook. Also, in guards formed on it, whereby the spring tongue is insured against lateral movement.

Combined Chamber-pail and Night-stool.—S. Smith, Brooklyn, N. Y.—*May* 28.—This invention consists in a combined chamber-pail and night-stool, composed of a body having a contracted opening at its top formed by an internal flange which serves as a seat, a detachable lid to said opening, and a separate mouth or spout covered by an independent hinged lid, the whole forming a new article of manufacture which possesses many advantages in the double use for which the utensil is designed.

Letter-sheet Blank.—A. C. Fletcher, New York City.—*May* 28.—This invention is intended for use under the penny postal law, and it consists in a peculiar conformation of the sheet, which is to be folded by two transverse creases, the lower fold of which is cut away or punctured at its two ends, so that when the upper fold, which is gummed at its two corners, is turned down, it is made to adhere to the lower fold, and, through the punctures therein, to the back or central portion of the folding sheet, so that whilst it would be difficult to decipher any writing on the inside, the sealed sheet could be bowed sufficiently at either end to expose any additional matter illegally inclosed.

OFFICIAL LIST OF PATENTS

ISSUED FROM THE UNITED STATES PATENT OFFICE

For the Week ending May 28, 1872,

AND EACH BEARING THAT DATE

[Reported officially for the "American Artisan."]

127,136.—Swinging Drawer for Sewing-machine Tables.—W. H. Alrich, Philadelphia, Pa.

127,137.—Air-engine.—W. Alworth, Scranton, Pa.

127,138.—Elevator.—L. Atwood, asgr. to G. W. Brown and I. S. Atwood, New York City. Ante-dated May 11, 1872.

127,139.—Hydraulic Elevator.—C. W. Baldwin, asgr. to C. Whittier and H. H. McBurney, Boston, Mass.

127,140.—Hot-air Furnace.—J. R. Baker, Chicago, Ill.

127,141.—Compound for destroying Insects.—J. G. Barker, Watertown, Mass.

127,142.—Machine for planing the Facets of Polygonal Bars, Nuts, etc.—W. F. Batho, Birmingham, England, asgr. to W. Sellers & Co., Philadelphia, Pa.

127,143.—Traction Engine.—W. C. Bibb, Madison, Ga.

127,144.—Gas-retort and Apparatus for Charging.—La F. Blair, Painesville, Ohio.

127,145.—Sewing-machine.—E. Bouscay, Jr., Norwalk, Ohio.

127,146.—Machine for upsetting Rods.—G. G. Burgess, Rawsonville, Ohio. Ante-dated May 11, 1872.

127,147.—Sliding Hinge for Safe-doors.—W. H. Butler, Brooklyn, N. Y.

127,148.—Thill-coupling.—C. C. Caner, asgr. of one-half his right to F. X. Dawson, Pataskala, Ohio.

127,149.—Table and Drawing-board combined.—C. W. Clift, Mystic Bridge, Conn.

127,150.—Transplanter.—H. C. Cook, Brenham, Tex.

127,151.—Blow-pipe.—J. Cooke, New York City.

127,152.—Bed-bottom.—W. Cook, New York City. Ante-dated May 10, 1872.

127,153.—Steam Pumping-engine.—G. H. Deane and C. P. Deane, Springfield, Mass. Ante-dated May 24, 1872.

127,154.—Reciprocating Engine.—G. H. Deane and C. P. Deane, Springfield, Mass.

127,155.—Bobbin-winder.—J. L. Demarest, asgr. to himself and F. W. Smith, Elmira, N. Y.

127,156.—Apparatus for forcing Beer from Barrels.—J. Devlin, Brooklyn, N. Y.

127,157.—Attachment for Sewing-machines.—G. E. Dolton, Monee, Ill. Ante-dated May 18, 1872.

127,158.—Hemming and Binding Attachment for Sewing-machines.—G. E. Dolton, Monee, Ill. Ante-dated May 18, 1872.

127,159.—Spindle for Spinning Machines.—G. Draper, Hopedale, Mass.

127,160.—Car-spring.—H. N. Eggleston, asgr. to himself and C. French, Seymour, Conn.

127,161.—Lubricator.—F. Ficht, Marinette, Wis. Ante-dated May 11, 1872.

127,162.—Gas Apparatus for melting Snow and Ice on Sidewalks, etc.—J. Folkmann and F. Kölgen, Vienna, Austro-Hungarian Empire.

127,163.—Car-axle Box.—C. A. Haskins, asgr. of one-third of his right to E. Smith, Chicago, Ill.

127,164.—Pneumatic Brake and Car-starter.—C. A. Haskins, asgr. of one-third of his right to E. Smith, Chicago, Ill.

127,165.—Burglar-alarm Apparatus for Portable Safes, etc.—S. J. Hoffman, Mobile, Ala.

127,166.—Guard for Nursery Doors or Windows.—A. Howard, Milford, Mass.

127,167.—Axle for Vehicles.—A. Y. Hubbell, New York City. Ante-dated May 11, 1872.

127,168.—Extension Table.—F. Huber, Franklin, Ind.

127,169.—Torsion Springs for Vehicles.—J. Kieser, New York City.

127,170.—Knife-sharpener.—T. K. Knapp, Dansville, N. Y.

127,171.—Bed-sofa.—F. Krater, Pittsburg, Pa.

127,172.—Cigar.—T. W. Kreitz, Quincy, Ill.

127,173.—Pump.—R. M. Lafferty, Toledo, Ohio, asgr. to Smith & Lafferty, Three Rivers, Mich.

127,174.—Whirligig.—W. H. Lansing, Troy, N. Y.

127,175.—Apparatus for generating Ozone.—O. Loew, New York City.

127,176.—Grab for extracting Well-tools.—J. H. Luther, Petroleum Center, Pa.

127,177.—Swivel for Rock and Well Boring Machines.—J. H. Luther, Petroleum Center, Pa.

127,178.—Collapsing Core-barrel.—R. Lye, Pittsburg, Pa.

127,179.—Banjo.—E. B. Mansfield, Boston, Mass. Ante-dated May 22, 1872.

127,180.—Manufacture of Ice and Refrigerating Machines.—S. B. Martin and J. M. Beath, San Francisco, Cal.

127,181.—Harvester-rake.—L. Miller, Akron, Ohio.

127,182.—Saw-tooth Swage.—W. P. Miller, New York City.

127,183.—Button.—R. J. Monks, Boston, Mass.

127,184.—Drip-pan for Refrigerators.—D. Mulcahy, Boston, Mass.

127,185.—Annunciator.—S. F. Nichols, Trappe, Md.

127,186.—Railway-car Body.—R. L. Omensetter, Philadelphia, Pa.

127,187.—Knife for uncapping the Cells of Honey-combs.—H. O. Peabody, Boston, Mass.

127,188.—Car-coupling.—W. W. Pitman, Freehold, N. J.

127,189.—Motive-power.—B. J. Sage, New Orleans, La. Ante-dated May 17, 1872.

127,190.—Concrete Pavement.—C. Scriber, Washington, D. C.

127,191.—Copper-lined Cylinder for Hydraulic Presses.—C. Sellers, asgr. to W. Sellers & Co., Philadelphia, Pa.

127,192.—Mode of transmitting Rotary Motion and preventing Reaction.—C. Sellers, asgr. to W. Sellers & Co., Philadelphia, Pa.

127,193.—Canceled.

127,194.—Canceled.

127,195.—Metal-turning Lathe.—W. Sellers, Philadelphia, Pa.

127,196.—Device for changing Rotary into Reciprocal Motion.—D. Shively, Bayard, Ohio.

127,197.—Vacuum-still, etc.—C. G. C. Simpson, Montreal, Canada.

127,198.—Safety-valve for Boilers.—R. P. Staats, asgr. to himself and J. T. Staats, New York City. Ante-dated May 14, 1872.

127,199.—Carding Machine.—L. St. George, North Bellingham, Mass.

127,200.—Registering Check-box for Railroad Conductors.—J. S. Stridiron, Detroit, Mich.

127,201.—Wire-stretcher.—C. H. Strowger, Webster, N. Y.

127,202.—Breech-loading Ordnance.—N. Thompson, Brooklyn, N. Y. Ante-dated May 20, 1872.

127,203.—Furnace-grate.—C. Van Wagenen, New York City.

127,204.—Washing Machine.—G. S. Walker and F. F. Adams, Erie, Pa.; said Walker asgr. to said Adams.

127,205.—Automatic Oil-cup.—J. H. Wilkinson, asgr. to R. Haworth, South New Market, N. H.

127,206.—Clothes-drier.—G. L. Woods, Manchester, N. H.

127,207.—Pocket-scissors.—A. J. Young, Dover, N. H.

127,208.—Compositor's Arm-rest.—C. L. Alexander, Washington, D. C.

127, 09.—Boring-tool.—F. S. Allen, New York City.

127,210.—Protractor and Parallel Rulers.—W. L. Apthorp, Tallahassee, Fla.

127,211.—Machine for turning Carriage-axles.—J. G. Aram, asgr. of one-half of his right to R. S. Williams, Cordova, Ill.

127,212.—Stalk-holder.—G. H. Aylworth, Brighton, Ill.

127,213.—Thill-coupling.—W. Bailey, Utica, N. Y.

127,214.—Hopper for Blast Furnaces.—D. Bauman, Parryville, Pa.

127,215.—Chemical Compound for destroying Nicotine in Tobacco.—S. O. Bentley, asgr. to himself and J. C. Kelly, Canton, Ohio.

127,216.—Operating Window-shutters.—H. Besse, Delaware, Ohio.

127,217.—Stove-pipe Shelf.—J. H. Betts, New Canaan, Conn.

127,218.—Fishing-seine Float.—T. Brown, Wellfleet, and T. Jarvis, Jun., Boston, Mass.

127,219.—Mechanical Movement.—A. C. Burner, Green Bank, W. Va. Ante-dated May 11, 1872.

127,220.—Mowing Machine.—J. Clarridge, Mount Sterling, Ohio.

127,221.—Folding-chair.—J. C. Compton, Clarksville, asgr. to himself and B. Pickel, Trenton, N. J.

127,222.—Carriage-axle.—A. B. Crandall, Sumner, Ill.

127,223.—Portable Store-counter.—J. H. Davis, Danville, Ky.

127,224.—Cotton-seed Cleaner.—W. H. Delamare, Deptford, England.

127,225.—Scroll-sawing Machine.—W. H. Doane, asgr. to J. A. Fay & Co., Cincinnati, Ohio.

127,226.—Paper-cutting Machine.—T. B. Dooley, Boston, Mass.

127,227.—Machine for making Wire Tubes.—W. C. Edge, Newark, N. J.

127,228.—Bedstead-fastening.—J. W. Elstun, Indianapolis, Ind.
127,229.—Pruning-knife.—J. Fasig, West Salem, Ohio.
127,230.—Lamp Chimney-cleaner.—H. Fellows, Bloomington, Ill.
127,231.—Stereoscope.—W. B. Glover, Boston, Mass.
127,232.—Clothes-rack.—G. W. Godfrey and E. J. Godfrey, Leslie, Mich.
127,233.—Car-brake.—S. E. Harrison, New Haven, Conn.
127,234.—Machine for polishing Heels of Boots and Shoes. —C. H. Helms, Poughkeepsie, N. Y.
127,235.—Forming Binder, Filler, and Wrapper for Cigars. —R. W. Heywood, Baltimore, Md. Ante-dated May 11, 1872.
127,236.—Barrel-roller.—S. G. Hill, Muscatine, Iowa.
127,237.—Boiler-tube Scraper.—J. Hobday, Jun., Ansonia, Conn.
127,238.—Fastening for Jewelry-boxes.—H. Hoefer, Brooklyn, N. Y.
127,239.—Grading Plow.—A. P. Hopkins, Bentleyville, Pa.
127,240.—Pitman Connection for Harvesters.—H. Howe, Houston, Minn.
127,241.—Scroll-sawing Machine.—S. Ide, Medina, N. Y.
127,242.—Bread-slicing Machine.—A. Iske and J. O. Steinheiser, Lancaster, Pa.
127,243.—Aerated Water-fountain.—J. C. Johnson, Louisville, Ky.
127,244.—Sewing-machine Covers.—Dorcas C. Junett, asgr. to herself and H. G. Swart, Troy, N. Y.
127,245.—Gas Machine.—J. Kaufmann, Jackson, Miss.
127,246.—Whip.—A. B. Kiersted, New Haven, Conn.
127,247.—Sash-balance.—W. H. King, Newark, N. J.
127,248.—Sash-holder.—W. H. King, Newark, N. J.
127,249.—Coffee-grinder.—C. Krutz, Adrian, Mich.
127,250.—Ammoniacal Gas-engine.—W. H. Laubach, Philadelphia, Pa.
127,251.—Car-coupling.—C. Layton, Matawan, N. J.
127,252.—Harvester.—C. Lidren, asgr. to himself and R. Jackson, Lafayette, Ind.
127,253.—Steam-cooking Apparatus.—J. A. Little, Cartersburg, Ind.
127,254.—Piston-rod Packing.—J. W. Lynch, Richmond, Va.
127,255.—Bedstead-fastening.—L. May, Columbus, Ga.
127,256.—Grain-drier.—F. H. C. Mey, Buffalo, N. Y.
127,257.—Die-cutter Stock.—H. C. Meyer, Flushing, N. Y.
127,258.—Grain-separator.—D. Y. Milligan, Shelbyville, Ill.
127,259.—Testing Burning-fluids.—P. Millspaugh, asgr. to Flora T. Millspaugh, Kent, Conn.
127,260.—Ore-crusher.—G. Mitchell, Philadelphia, Pa.
127,261.—Wind-wheel.—N. P. Mix, Columbus, Ohio.
127,262.—Apparatus for heating by Hot Water.—G. Nixon, Philadelphia, Pa.
127,263.—Washing Machine.—J. P. Packer, Flemington, Pa.
127,264.—Manufacture of Artificial Stone.—J. E. Park, Rutherford County, Tenn.
127,265.—Fireplace or Franklin Stove.—J. Peckover, Cincinnati, Ohio.
127,266.—Trivet.—J. Peckover, Cincinnati, Ohio.
127,267.—Fulling Mill.—S. M. Pike, asgr. to himself and W. Walton, Providence, R. I.
127,268.—Bottle-holder.—W. O. Pond, Mobile, Ala.
127,269.—Dental Drill.—W. M. Reynolds, New York City.
127,270.—Electrical Wood-divider.—G. Robinson, New York City.
127,271.—Butter-worker.—J. Romans, Homeville, Pa.
127,272.—Spring for Vehicles.—C. W. Saladee, St. Catharine's, Canada.
127,273.—Handle-fastening for Traveling-bags.—M. Schwerin, Newark, N. J.
127,274.—Curtain-fixture.—F. B. Scott, Lancaster, N. Y.
127,275.—Saddle-clip for Carriages.—F. Seward, New Haven, Conn.
127,276.—Combined Cotton Press, Gin, and Horse-power.—J. M. Shaw, Sen., Water Valley, Miss.
127,277.—Hose-cart.—W. E. Shaw and C. A. Ashley, Stockton, Cal.
127,278.—Bed-bottom.—H. T. Smith, Washington, D. C.
127,279.—Pruning-shears.—G. D. Spielman, Lancaster, Ohio.
127,280.—Fastening for Retort-lid.—G. Stancliff, New York City.
127,281.—Bee-hive.—J. B. Stannton, Ellicottville, N. Y.
127,282.—Fence.—C. H. Strowger, Webster, N. Y.
127,283.—Medical Compound or Liniment.—W. H. Wagoner, Hurd Post Office, Pa.
127,284.—Pump.—C. Wilson, Bridgeport, Conn.
127,285.—Canceled.
127,286.—Lathe for turning Irregular Forms.—E. K. Wisell, Warren, Ohio.
127,287.—Tuck-marker for Sewing-machines.—E. S. Yentzer, Chicago, Ill.
127,288.—Manufacture of Hoes.—W. Acheson and W. H. Ridley, Pittsburg, Pa.
127,289.—Mode of constructing Buildings.—C. M. Amsden, Wooster, Ohio. Ante-dated May 14, 1872.
127,290.—Washing Machine.—L. B. Anderson, Hewlett's, Pa.
127,291.—Extension Table.—J. J. Arnaud, Boston, Mass.
127,292.—Sash-balance.—A. C. Arnold and O. G. Hauschildt, Norwalk, Conn.
127,293.—Cultivator.—R. H. Avery, Galesburg, Ill. Ante-dated May 17, 1872.
127,294.—Mechanical Movement.—H. H. Baker, New Market, N. J.
127,295.—Horse Hay-rake.—N. M. Barnes, Tiffin, Ohio.
127,296.—Hub-boring Machine.—A. Bascom, Seneca, Mich.
127,297.—Fly-trap.—V. D. Beach, Battle Creek, Mich. Ante-dated May 13, 1872.
127,298.—Washing Machine.—W. B. H. Beach, Naples, N. Y.
127,299.—Revolving Table.—J. H. Beem and A. O. Morgan, Roseville, Ohio.
127,300.—Wheel for Vehicles.—A. L. Blackman, Cross Plains, Tenn.
127,301.—Machine for brushing Clothes.—W. M. Blume, New York City.
127,302.—Table-slide.—W. J. Boda, Dayton, Ohio.
127,303.—Carpet-stretcher.—E. W. Bullard, Barre, Mass.
127,304.—Wood Pavement.—J. J. Burrows, asgr. to himself and J. W. Fitzhugh, Washington, D. C.
127,305.—Governor for Steam-engines.—J. S. Camac, Shickshinny, Pa., asgr. of one-third of his right to S. A. Terry, Washington, D. C.
127,306.—Heating-stove.—G. Candee, Berea, Ky., asgr. of one-half his right to C. L. Tambling, Oberlin, Ohio.
127,307.—Water-closet.—W. S. Carr, New York City.
127,308.—Metallic Cartridge.—J. W. Cochran, New York City. Ante-dated May 14, 1872.
127,309.—Artificial Stone.—H. A. Cooke, Fall River, Mass.
127,310.—Zinc-board for Stoves.—W. S. Cottrell, Chicago, Ill.
127,311.—Door-spring.—J. J. Cowell, asgr. to J. B. White, Newark, N. J. Ante-dated May 11, 1872.
127,312.—Bedstead.—H. B. Coyle, Philadelphia, Pa.
127,313.—Lubricating Axle-nut.—D. Dalzell, South Egremont, Mass.
127,314.—Builders' Jack.—J. F. Darley, Nebraska City, Neb.
127,315.—Safety-stop for Steam-engines.—W. H. Darling, asgr. to himself and J. B. Sharp, New York City.
127,316.—Printing-press.—F. O. Degener, Brooklyn, N. Y.
127,317.—Thill-coupling.—J. Devereaux and R. H. Davis, M.D., Jackson, Mich.
127,318.—Loom for weaving Slat-blinds.—J. L. Devol, Parkersburg, W. Va.
127,319.—Tool for cutting Splints.—J. L. Devol, Parkersburg, W. Va.
127,320.—Lock-nut.—J. Dinsmore, Dinsmore, Pa.
127,321.—Hot-air Furnace.—C. M. Drennan, Boston, asgr. to himself and F. Alger, Natick, Mass.
127,322.—Pumping Engine.—E. D. Eames and F. W. Eames, Grand Rapids, Mich. Ante-dated May 20, 1872.
127,323.—Magazine for Firearms.—W. H. Elliot, New York City.
127,324.—Harvester.—J. H. Elward, Polo, Ill.
127,325.—Washboard.—J. Epeneter and B. Grahl, Council Bluffs, Iowa.
127,326.—Sawing Machine.—T. B. Fagan, Mendon, Ohio.
127,327.—Bustle.—T. F. Fessenden, Providence, R. I.
127,328.—Lubricating Oil.—H. Fink and Catharine Fink, Baltimore, Md.
127,329.—Gas-burner.—F. A. Fisher, Cranford, N. J.
127,330.—Letter Sheet-blank.—A. C. Fletcher, New York City.
127,331.—Safety-mask.—D. W. Flora, Newaygo, Mich. Ante-dated May 25, 1872.
127,332.—Air-brake for Railway-cars.—C. Fogelberg, Boston, Mass.
127,333.—Gong-bell.—H. A. Foss, New Britain, Conn.
127,334.—Siphon.—J. W. Fox, Cincinnati, Ohio.
127,335.—Sawdust-feeder for Furnaces.—M. Garland, asgr. to Garland, Ingram & Co., West Eau Claire, Wis.
127,336.—Device for locking Nuts.—P. L. Gibbs, Dunleith, Ill.
127,337.—Machine for preparing Wood for Pulp.—A. K. Gilmore, East Turner, asgr. to himself, S. R. Jackson, Brunswick, and S. A. Perkins, Topsham, Maine.
127,338.—Parlor-bed.—H. Goodrich, Stoneham, Mass.
127,339.—Safety-pocket.—L. Goodyear, Trumansburg, N. Y.
127,340.—Swing-compression Basin-cock.—W. Gordon, asgr. of two-thirds of his right to A. McCambridge and T. Kennedy, Philadelphia, Pa.
127,341.—Basin-faucet.—W. Gordon, asgr. to himself, T. Kennedy, and A. McCambridge, Philadelphia, Pa.
127,342.—Box-opener.—J. W. Hankenson, Minneapolis, Minn.
127,343.—Lasting-knee.—C. H. Haskell, Lynn, Mass.
127,344.—Machine for grinding and polishing Glass.—A. Hathaway, Lennox, Mass.
127,345.—Potato-digger.—A. Heulings, Philadelphia, Pa.
127,346.—Combined Bag-holder and Truck.—J. Hewitt, Albany, N. Y. Ante-dated May 22, 1872.
127,347.—Snap-hook.—A. A. Hotchkiss, Sharon, Conn.
127,348.—Photographic Embossing Apparatus.—H. Holt, Brooklyn, N. Y.
127,349.—Tuck-marker for Sewing-machines.—J. S. Hugg, Camden, N. J.
127,350.—Manufacture of Acids and Paints from the Materials used to Purify Gas.—J. Hughes, Stapleton, asgr. to himself and J. C. Thompson, New Brighton, N. Y.
127,351.—Molder's Gate or Sprue.—J. M. Killin, Pittsburg, Pa.
127,352.—Abdominal Supporter.—A. T. Kirk, Chicago, Ill.
127,353.—Manufacture of Pressed-wood Articles.—O. Knipfer, asgr. to C. Spooner, Bridgeport, Conn.
127,354.—Machine for picking Curled Hair, etc.—L. F. Lannay and J. Webb, Baltimore County, Md.
127,355.—Peach-stoner.—J. S. Lester, asgr. to himself and J. S. Willson, Atlanta, Ga.
127,356.—Atomizer.—H. D. Lockwood, Charlestown, Mass.
127,357.—Nipple for Nursing-bottles.—H. D. Lockwood, Charlestown, Mass.
127,358.—Blower.—W. Moore and W. Pruett, Kokoma, Ind.; said Pruett asgr. to J. Chandler.
127,359.—Nut-lock.—A. Morley, New Troy, Mich.
127,360.—Machine for making Tooth-picks.—S. Noble and J. P. Cooley, Granville, Mass.
127,361.—Apparatus for cleaning Railway Tracks.—J. Paradis, asgr. to himself, W. H. Drew, and Sarah Parker, Brooklyn, N. Y. Ante-dated May 14, 1872.
127,362.—Steam-boiler Feeder.—S. J. Parker, Rochester, N. Y. Ante-dated May 14, 1872.
127,363.—Mallet.—A. Partridge, Medway, Mass.
127,364.—Ship's Pump for Liquid Freight.—S. F. Paullin, Baltimore, Md.
127,365.—Fire-kindler.—B. Pickering, Dayton, Ohio.
127,366.—Carburetter.—C. H. Pierson, Plainfield, N. J., asgr. of one-half of his right to E. B. Denny, New York City.
127,367.—Extension Window-cornice.—A. Pohl (Anna G. Pohl, administratrix), Brooklyn, N. Y.
127,368.—Motive Power.—W. S. Reeder, asgr. to himself and P. P. Child, St. Louis, Mo.
127,369.—Electro-magnetic Motor.—W. H. Richardson, asgr. of one-half of his right to H. C. Haskell, Albany, N. Y.
127,370.—Combined Rake and Tedder.—R. H. Russell, Lima, asgr. to J. G. Scott, Thornbury, Pa.
127,371.—Pleasure Vehicle.—C. W. Saladee, St. Catharine's, Canada.
127,372.—Plow.—A. Sanborn, St. Johnsbury, Vt.
127,373.—Sawing Machine.—C. L. Schulz, Baltimore, Md.
127,374.—Sawing Machine.—C. L. Schulz, Baltimore, Md.
127,375.—Process and Apparatus for removing Tin from Tin Scrap.—C. A. Seely, York, N. Y.
127,376.—Blind-slat Adjuster.—W. B. Sloan, Hamburg, Iowa.
127,377.—Toy-revolver and Fire-cracker Holder.—A. M. Smith, Brooklyn, N. Y.
127,378.—Combined Chamber-pail and Night-stool.—S. Smith, Brooklyn, N. Y.
127,379.—Egg-carrier.—S. H. Smith, asgr. of one-half his right to W. H. Wilber, North Adams, Mich.
127,380.—Wagon-brake.—D. T. Snelbaker, asgr. to himself and M. T. Delorac, Cincinnati, Ohio.
127,381.—Gas-retort.—T. G. Springer, Fayette City, Pa.
127,382.—Automatic Steam-trap.—J. K. Stayman, Carlisle, Pa.
127,383.—Piano-forte.—C. F. T. Steinway, asgr. to himself, A. Steinway, and W. Steinway, New York City.
127,384.—Piano-forte.—C. F. T. Steinway, asgr. to himself, A. Steinway, and W. Steinway, New York City.
127,385.—Joint for Railway Rails.—J. W. Stell, Gonzales, Tex.
127,386.—Breech-loading Firearm.—J. F. Thomas, Ilion, N. Y.
127,387.—Saw-frame.—S. P. Tift, Groton, Conn.
127,388.—Oyster-can.—J. A. Tillery, asgr. to himself and S. A. Ewalt, Baltimore, Md.
127,389.—Canal-lock.—I. Townsend, Capeville, Va.
127,390.—Fire-extinguishing Engine.—J. B. Van Dyne, Louisville, Ky.
127,391.—Car-axle Lubricator.—R. Vose and J. M. Evans, New York City.
127,392.—Pea-nut Thrasher and Separator.—J. H. Walker, Walker's Landing, Tenn.
127,393.—Furnace for burning Sawmill and other Refuse.—P. Walker, Muskegon, Mich.
127,394.—Steam-boiler.—O. Weheskey, Providence, asgr. of one-half his right to B. F. Arnold, Westerly, R. I.
127,395.—Apparatus for the Manufacture of White-lead.—C. L. Wheeler, Pittsburg, Pa.
127,396.—Wood-bending Machine.—J. L. Whipple and E. Trowbridge, Detroit, Mich.
127,397.—Dredging Machine.—N. A. Williams, Warwick, R. I.
127,398.—Moldess' Flask.—S. Williamson, Cincinnati, Ohio.
127,399.—Cotton-planter.—J. Wood, Wedowee, Ala.
127,400.—Cotton-seed Planter.—W. R. Wright, assignor of two-thirds of his right to C. E. Malone and E. G. Willingham, Allendale, S. C.
127,401.—Propelling Canal-boat.—C. H. Jenner, Brockport, Ill.

RE-ISSUES.

4,913.—Steam Cotton-press.—A. Baldwin, asgr. to the Compressing Company, New York City. Patent No. 103,123, dated May 17, 1870.
4,914.—Journal-bearing.—S. Croll, asgr. of two-thirds interest to R. T. Barrett and E. T. Plush, Philadelphia, Pa. Patent No. 124,485, dated March 12, 1872.
4,915.—Fruit and Vegetable Crusher.—R. Daniels, Woodstock, Vt. Patent No. 109,913, dated February 21, 1871.
4,916.—Collar.—Harriet G. Emery and Margaret C. Fuller, Boston, Mass. Patent No. 105,442, dated July 19, 1870.
4,917.—Pipe-tongs.—H. Herbert, Cincinnati, Ohio. Patent No. 45,196, dated December 20, 1864.
4,918.—Stove-pipe Drum.—B. J. Hobson, Covington, Ky., asgr. of one-half interest to W. H. Richardson, Cincinnati, Ohio. Patent No. 119,609, dated October 3, 1871.
4,919.—Machine for bending Fifth Wheels.—C. Kieser, asgr. to E. Ames, Baltimore, Md. Patent No. 32,947, dated July 30, 1861.
4,920.—Treating Tanned Leather.—B. H. Lightfoot, Philadelphia, Pa. Patent No. 40,669, dated Nov. 17, 1863.
4,921.—Speeder for spinning and twisting Roving.—T. Mayor, asgr., by mesne-assignments, to himself and G. Chatterton, Providence, R. I. Patent No. 92,859, dated July 20, 1869.
4,922.—Railroad-car Heater.—H. R. Robbins, Baltimore, Md. Patent No. 114,349, dated May 2, 1871.
4,923.—Ruffler for Sewing-machines.—C. Scharfe, asgr. to W. G. Wilson, Cleveland, Ohio. Patent No. 89,085, dated April 20, 1869.
4,924.—Apparatus for applying Chalk to Locomotive-wheels.—N. Sehner, asgr. to himself, J. H. Seymour, and A. R. Appleman, Hagerstown, Md. Patent No. 124,165, dated Feb. 27, 1872.
4,925.—Plow.—G. W. Thompson, asgr. of two-thirds interest to N. Hawk and J. W. Atwood, Manchester, Ohio. Patent No. 110,692, dated Jan. 3, 1871.
4,926.—Swing-bridge.—G. R. Winkler, asgr. to B. Berndt and Martha Winkler, Williamsport, Pa. Patent No. 86,117, dated Jan. 19, 1869.

DESIGNS.

5,876.—Table-spoons.—B. D. Beiderhase, New York City.
5,877.—Picture-frames.—J. J. Gray, Boston, Mass.
5,878 to 5,880.—Carpet-pattern.—A. Heald, asgr. to McCallum, Crease & Sloan, Philadelphia, Pa.
5,881.—Floor-cloth Pattern.—A. Heald, asgr. to McCallum, Crease & Sloan, Philadelphia, Pa.
5,882.—Stove-front.—G. Smith and H. Brown, asgrs. to C. Noble & Co., Philadelphia, Pa.

EXTENSIONS.

20,249.—Machinery for hulling and thrashing Clover.—J. C. Birdsell, May 18, 1858; re-issued April 8, 1862. No. 1,299.
20,267.—Thick Woven Fabrics.—J. Gujer, May 18, 1858. (Barbara Gujer, administratrix.)
20,313.—Device attached to Hand-saws for Squaring and Marking.—H. Smith, assignor to H. Disston, May 18, 1858.
20,306.—Machine for affixing Post-office Stamps to Letters.—G. K. Snow, May 8, 1858; re-issued to R. Hoe & Co., assignees, August 20, 1867. No. 2,737.
20,277.—Machines for grinding and sizing Paper-pulp.—J. Jordan, Jr., and T. Eustice, May 18, 1858; re-issued December 4, 1860, to J. Jordan, Jr., H. Keney, and Grant, Warren & Co. No. 1,088.

TRADE-MARKS.

833.—Card-stock, Wedding and Visiting Papers, etc.—Bergen & Bainbridge, New York City.

834 and 835.—WOVEN AND KNITTED GOODS.—M. Landenberger & Co., Philadelphia, Pa.
836.—CHEMICAL TEST AND DETECTOR FOR BANK-CHECKS.—J. W. McKennan, Philadelphia, Pa.
837.—VACCINE.—J. Milhau's Sons, New York City.
838.—VAGINAL INJECTING SYRINGE.—W. Molesworth, New York City.
839.—SHEETINGS AND FLANNELS OF COTTON.—Paton & Co., New York City.
840.—AXES.—The Underhill Edge-tool Company, Nashua, N. H.
841.—STRENGTHENING BITTERS.—J. T. Webber & Co., Springfield, Mass.
842.—TEAS, COFFEES, AND SPICES.—J. G. Worth, New York City.

DISCLAIMERS.

39,779.—BAND-RUFFLES.—Emma C. Wooster, assignee of the whole right of T. Robjohn, New York City. Dated Sept. 1, 1863.

65,184.—BASE-BURNING STOVES.—W. C. Durant and W. Buswell, West Troy, and A. Brown, Troy, N. Y., to the extent of their interest in the patent of W. C. Durant. Dated May 28, 1867.

QUERIES.

WE will hereafter publish in this column such queries as are from their nature likely to elicit practical answers of general utility to our readers. Questions not relating to business, and of merely personal interest to the querist, will not be published here, but we will willingly give them such attention in private correspondence, as we can, without neglect of more important duties. We earnestly solicit from our readers either queries or answers, of such a character as we have specified, and we hope by this means to make our paper a valuable medium of intercommunication between them.

1. TELESCOPE.—What is the difference between a terrestrial and astronomical refracting telescope? T. H. P.

2. VARNISH.—Will some one give me a recipe for a good varnish for labels. Something that dries quickly? G. V.

3. VARNISH FOR BALLOONS.—I would like some reader of the ARTISAN to furnish me a recipe for a varnish for balloons? G. V.

4. KEROSENE IN BOILERS.—I have been advised to use kerosene in a boiler to prevent scale. Is it either efficient or safe? J. C. W.

5. COOLING BY AIR CURRENTS.—Why is it that a wind warmer than the human body blowing upon the body gives a sensation of coolness? A. J. D., of Ill.

6. BELTS.—Do belts run better on the flesh side or the hair side?

7. STEEL CUTTER.—I wish to know the diameter and number of revolutions of a smooth-faced soft steel cutter, such as is used in cutting the screw point on augers? A.

ANSWERS TO QUERIES.

FLOW OF LIQUIDS.—S. W. asks, Query No. 6, last issue, the relation of the actual to the theoretical flow of liquids through an orifice in the side of a vessel. The actual flow is only about two-thirds the theoretical flow, or that which would take place were it not for the *vena contracta* (contracted vein). This has been fully determined by experiment, and may be fully relied upon by S. W. J. R. H., OF N. J.

HARDENING TALLOW.—A. F., Query No. 5, can harden tallow by using the following recipe:—To one pound of tallow take one-fourth of a pound of rosin and melt them together. Tallow thus hardened makes candles of superior quality. Its dark color is the only objection to it. P. H. W., OF PA.

J. R. L., OF N. Y.—Wool-grease has as yet found no important industrial use, although it has been to some extent investigated by chemists. We have, however, no doubt that some use will ultimately be found for it.

B. C. R., OF N. J.—There is no coating which can be applied to pipes of metal to increase their heat-conducting power.

H. P. C., OF OHIO.—The carbon used in batteries is that known as gas carbon, produced in gas-making.

A. R., OF KY.—A recipe for silver solder is as follows:—Silver coin, 17 dwts.; copper, 2 dwts. 12 grains; zinc, 2 dwts. First melt the silver and copper, then cool down the silver and copper alloy to as low a point as possible and still keep it melted, then put in the zinc, after which heat again till thoroughly melted.

M. C. F., OF VA.—We are not acquainted with the quality of the article you mention, and we should not assume to discuss it in our paper if we were. Our advertising columns are at the services of any one who wishes publicity for the merits of his wares.

D. B. M., OF N. H.—Use wax to secure the leathers in your vise jaws.

H. L. P., OF VT.—We judge from your description of the noise made by the gearing in question that the teeth are very badly cut. If this were not the case, the noise should not be excessive when the teeth are well greased, unless the shafts are out of line.

L. S., OF N. Y.—The friction of shafts in their bearings increases directly as their weight increases, including, of course, the weight of the pulleys they carry, and not taking into account the pressure upon the bearings caused by belts, gears, etc. As these elements vary, the only way to practically determine the friction of a line of shafting is by using a dynamometer.

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WILLIAM ORTON, PAUL B. DU CHAILLU, Sir Francis Crossley, Queen Louisa of Prussia, with a dozen other portraits, etc., in June number PHRENOLOGICAL JOURNAL. Newsmen have it, or will procure it. Reformation for Juvenile Offenders, by Gov. Brown, of Mo., is full of useful suggestion; What is the Tariff Question? by Horace Greeley, will attract attention; Steal or Starve, by Rosine Knight, is pathetic; Monticello, Home of Thomas Jefferson, by Mrs. Halloway, is interesting; Artists will enjoy the Stereoscope, or the Marvels of Binocular Vision; also, Anatomy and Philosophy of Expression, illustrated; The Chinese in the Philippines, by Capt. Beckwith, illustrated; Walking, its Effects on Health; Preachers and Preaching, by H. W. Beecher; His Views on the study of Human Nature; The Bible not Enough; Divine and Human; Total Depravity; Materialism, etc.; What can I do Best? The Shakers—Have they made a Mistake? Sketch of Ann Lee; Office-seeking; Carbon and its Different Forms: Diamond, Graphite, Coal; What do we Understand by ADAM? Life Insurance; Can we Mold our Features? Spiritualism Answered by Science; Light and Colors; Electricity and Life. With much other most instructive matter. Only 30 cts., $3 a year. End of Volume 54. A new volume begins with next number. S. R. WELLS, No. 389 Broadway, New York. 23-24

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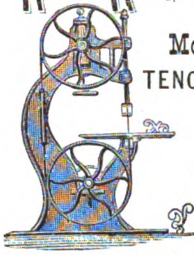

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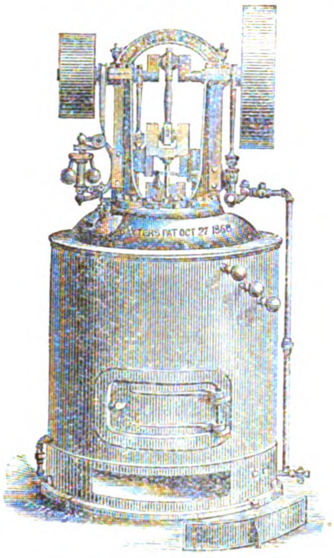

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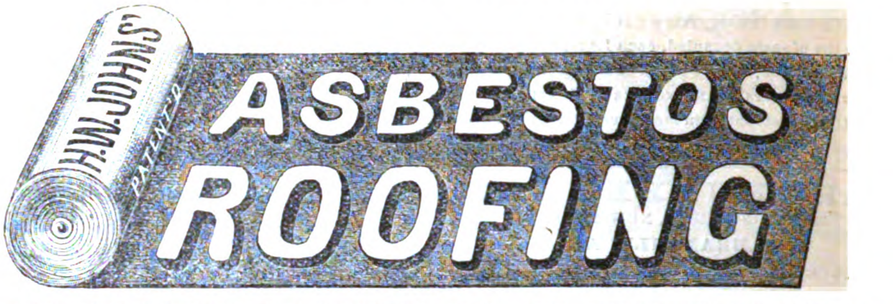

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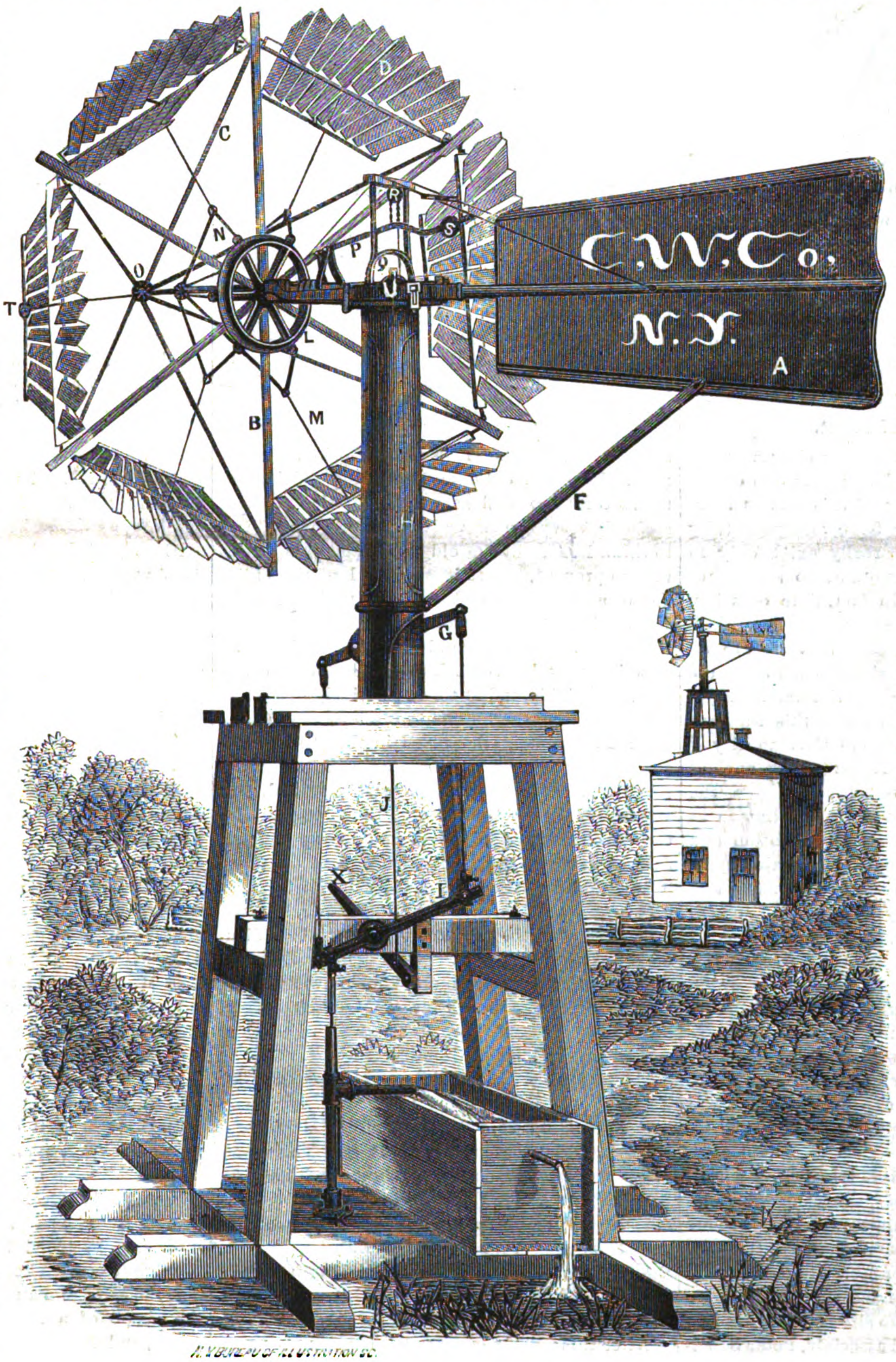
The most striking feature of this windmill is expressed in the word self-regulating. It adjusts itself to the force of the wind, so that it can be arranged to give a much more uniform power than any windmill which has preceded it.

The parts and their operation will be gathered from the following description, referring to the engravings:—A is the vane, B an arm, C front brace, D a slat or sail, E an axis of the sail (called also section bar), F a brace supporting the vane, G a ball lever or upper walking beam, H the column on which the turn-table is placed, I the intermediate lever or lower walking-beam, to which the pump is attached, J the stop rod, K flange fastening for the pipe, L the hub wheel to which the arms are secured, M the connection between the sails, and N the peculiar umbrella-like braces or links which connect the sails with the weight, S, on the lever, P, so that the weight acts with a constantly increasing force the further the sails are turned back from the wind; O is a casting to which the front braces are secured, P is the weighted lever, Q the bridge or arch for supporting truss-rods of vanes, R grooved roller for the chain, and S a weight combined with and to counteract the centrifugal weight, T (one to each sail). These weights, T, act by their centrifugal force, and turn the sails more from the wind whenever the velocity increases. The sails are so constructed as to also be turned back by the direct pressure or force of the wind, and this peculiar combination of forces is the special characteristic of the mill.



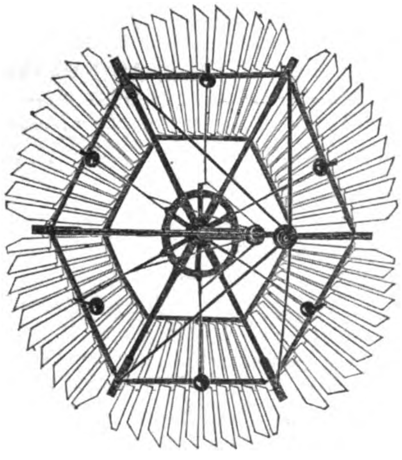
BROWN'S SELF-REGULATING WINDMILL.

As we have intimated above, a large number of these mills are now in use in this vicinity, and we may add that they give universal satisfaction. The beauty of their motion and their sensitiveness in adapting themselves to different forces of air-currents is the first thing which attracts the observer, and on closer examination he will be surprised at the amount of power developed.

We believe these mills are destined to a very extended application for agricultural purposes. For use in irrigation and pumping for railways they are, in our opinion, un-

equaled by any other motive power. For many small shops where power is desired for sawing, boring, turning, etc., they furnish the cheapest and safest motor in the market.

They are so constructed that they will stand heavy gales, instances having occurred in which



Face View of Windmill.

they outlived wind storms which did great damage to other property.

Further information or full descriptive circulars can be obtained from the manufacturers, whose address is given above, and where, also, one of these mills is employed to raise water to the distributing reservoir which supplies the building.

A Souvenir of Faust.

HISTORY presents many singular circumstances in connection with the popular superstition on the subject of curses. Nothing of this sort is more striking, however, than the force and perpetuity some of these bans, that really exist only in the imaginations of the ignorant, do sometimes actually seem to possess. In fact, time occasionally exhibits such an exact and unvarying fulfillment of the original malediction that we are almost tempted, at the first view, to believe in a direct interposition of some superhuman agency.

A peculiarly interesting case of this kind occurred, not long ago, in the old German city of Mentz, or, more properly, Mainz. This ancient municipality, it will be remembered, was the home of Johann Gensfleisch (better known as Gutenberg), and the scene of his invention and improvements in connection with movable type. Many old traditions concerning Gutenberg and his associate, the wealthy goldsmith, Johann Faust, have been preserved, and are still repeated in that locality. Of course, too, the latter individual has been endowed, here as well as elsewhere in Germany, with a very unenviable reputation. Partly because he was the most notable name at first connected with the new and apparently magical art of printing, and partly through confusion with Dr. Faustus, the hero of Goethe's drama and Lessing's poem, he has long been spoken of among the lower order of Germans as a man in league with the devil, and therefore irredeemably lost. As is usual also in such cases, everything belonging or in any way appertaining (as the lawyers have it) to this same professor of "ways that are dark and deeds that are vain" has shared his evil treatment at the hands of fame.

Now, it happened that the site of the house in which Faust and his second associate, Peter Schöffer, carried on their business after the former had deprived Gutenberg of all his printing materials, came to be occupied, some years since, by an extensive brewery. The proprietor thereof was a successful man, and his beer had obtained a wide and favorable reputation. Finding that his growing business required more room, he began to make additions to the original building; and, among other improvements, had a cellar dug underneath it, to be used for storage. In the course of their excavations the workmen came upon an old worm-eaten beam, with an iron screw, thickly coated with rust, through the middle of it. Further investigations, and a careful examination and comparison of the best authorities, made it certain that they had discovered the original printing-press used by Faust and Schöffer. The old, decayed remnant was immediately cleansed, restored to a place of honor, and exhibited to visitors as a curious relic of the past, and an object of interest to civilized people all over the world. The sight-seers came in crowds to inspect it, and the worthy brewer then began to have a very high opinion of the value attaching to his accidentally acquired treasure. When, at last, many of the most celebrated scholars and scientific men of Europe, as well as the Kings of Prussia and Bavaria, with other lesser grandees, had visited him and expressed great interest in his discovery, he became perfectly infatuated on the subject. It occupied his mind constantly, to the exclusion of everything else, and he gradually neglected his legitimate business more and more. He confidently expected to realize an enormous sum by the sale of his press, and, consequently, took little pains to preserve his old run of custom. His wife, however, was by no means so sanguine about the vast fortune the object in question was to bring them; and, indeed, the good lady always looked upon it as an ill-omened and dangerous thing, redolent of the sorcerer's art and suggestive of the blackest *diablerie*. Her constant advice to her husband was to think less about the old press, and take measures to prevent, before it was too late, the entire loss of a prosperous and lucrative trade. But he was deaf to all her arguments, and at last grew so impatient at her importunity, that, from being an affectionate and devoted husband, he became morose, unsociable, and at times positively savage.

One morning there came to the brewer's door a little Frenchman, who asked in the most polite and propitiatory manner to be allowed to inspect the press. After having his wish gratified, and when he had expressed his admiration with a mixture of courtesy and enthusiasm that was wonderful to see, he made known his desire to purchase it in behalf of a certain society in Paris. His first offer was of twenty thousand francs, but the brewer scouted the idea, declaring it to be ridiculous. With a shrug of polite depreciation, the other bid five thousand more, but this was also instantly rejected. Thus they went on chaffering, until finally the visitor proffered fifty thousand francs, and declared with mild earnestness that he could positively go no higher. Seeing that her husband was again going to refuse, the woman begged him to accept that sum while he had the chance, and let the unlucky thing go. The wrath of the excited German now broke out with a force like that attending the "Berserker rage" in the days of old; and shouting out, "Zum Hengste mit euch!" he struck his helpless "frau" a blow in the face that stretched her at full length on the floor. The horrified Gaul took his leave forthwith, and thus the negotiation ended.

After this nobody came to bid for Faust's press. But its possessor did not lose faith for an instant in the prospect of the wealth he was to derive from its sale. His vocation, so long neglected, now ceased to afford him a decent support, for his customers nearly all became disgusted with his carelessness, and left him. At last his creditors seized upon all the appurtenances and furniture of his brewery to satisfy their claims, and would certainly have attached even his cherished press if he had not, before their advent, escaped with it and fled to a town in the neighboring Duchy of Nassau.

There he was living, at last accounts, in great poverty and distress, but still refusing persistently to part with his relic for less than an amount which the decreased interest in a curiosity no longer new made it impossible for him even to obtain.

His wife tried, at first, to keep a small beer-shop in a portion of the building that had once been too small for their business. But, to crown their misfortunes, the whole structure was destroyed by fire, and she was left without a *groschen* in the world. She has since been accustomed to relate, often with tears in her eyes, how she and her husband have been utterly ruined by his discovering and taking possession of a thing on which the curse of the devil rested. Many of her neighbors also, and others who were cognizant of the circumstances, seem equally persuaded that the unhallowed and ill-omened printing-press caused all the trouble.

With all due deference to these good folks, however, it naturally suggests itself to the unsuperstitious mind that the difficulty lay in the man's want of common sense, and that his ruin was brought about very naturally by neglect of his regular occupation. And, under this view, htere can be no doubt that, if the press should come into the possession of anybody capable of making a practical use of it, it may be changed from a curse into a fortunate and valuable acquisition.

Although it has long since ceased to be a nine days' wonder, yet the interest every one must naturally feel in such a specimen of mediæval invention (connected as it is with one of the greatest arts the world has ever known), would warrant its purchase for some museum or other public exhibition. And such, there can be little doubt, will be its ultimate fate.

REMINISCENCE OF PAPER-MAKING.—It is said that William East, an English paper-maker, once upon a time set his men to work, and went away on business. While the men were at dinner, Mrs. East accidentally let a blue-bag fall into one of the vats of pulp. Alarmed at the occurrence, she determined to say nothing about it. Great was the astonishment of the workmen when they saw the peculiar color of the paper, and great the anger of Mr. East when he returned and found that a whole vat of pulp had been spoiled. After giving the paper made from it warehouse room for four years, Mr. East sent it up to his agent in London, to be sold "for what it would fetch." "For what it will fetch!" said the agent, misunderstanding the meaning; "well, it certainly is a novelty, but he must not expect too much." So he sold the whole at a considerable advance upon the market price, and wrote to the mills for as much more as he could get. The surprise of Mr. East may be imagined. He hastened to tell his wife, who found courage to confess her share in the fortunate accident, and to claim a reward, which she received in the shape of a new cloak. Mr. East kept his secret, and for a short time supplied the market with the novel tint, until the demand far exceeded the supply, and other makers, discovering the means used, competed with him.

Gunpowder.—How it is Made.—A House Where Men Never Laugh.

How do you think you would like to live, fearing every moment to be blown up—not daring to speak aloud, to jar anything, for fear of starting an explosion that would send you in an instant to the other world?

You don't think it would be very pleasant? Well, it isn't, yet hundreds of men live in just that state; work, receive pay, and live, year after year, in the very sight of death, as it were—all that the world may have gunpowder.

You can easily guess that those men go about quietly, and never laugh. You know that gunpowder is very dangerous in a gun, or near a fire, but perhaps you don't know that it is equally dangerous all through the process of making. A powder mill is a fearful place to visit, and strangers are very seldom allowed to go into one. They are built far from any town, in the woods, and each branch of the work is done in a separate building. The houses are quite a distance from each other, so that, if one blows up, it won't blow up the rest. Then the lower parts of the building are made very strong, while they are very lightly set on, so that if it explodes only the roof will suffer. But in spite of every care, sometimes a whole settlement of the powder mills will go off almost in an instant, and every vestige of the toil of years will be swept away in a few seconds.

But though you feel like holding your breath to look at it, it is really a very interesting process to see. It is made, perhaps you know, of charcoal, saltpeter, and brimstone. Each of these articles is prepared in a house by itself, but the house where they are mixed is the first terrible one. In this building is an immense mill-stone, rolling round and round in an iron bed, and under the stone are put the three fearful ingredients of gunpowder. There they are thoroughly mixed and ground together. This is a very dangerous operation, because if the stone comes in contact with its iron bed, it is very apt to strike fire, and the merest suspicion of a spark would set off the whole. The materials are spread three or four inches thick in the bed; the wheel, which goes by water-power, is started, and every man leaves the place. The door is shut, and the machinery left to do its terrible work alone. When it has run long enough the mill is stopped, and the men come back. This operation leaves the powder in hard lumps or cakes.

The next house is where the cakes are broken into grains, and, of course, is quite as dangerous as the last one. But the men can't go away from this; they are obliged to attend to it every moment, and you may be sure no laugh or joke is ever heard within its walls. Every one who goes in has to take off his boots and put on rubbers, because one grain of the dangerous powder crushed by the boot would explode the whole in an instant.

The floor of this house is covered with leather, and is made perfectly black by the dust of the gunpowder. It contains a set of sieves, each one smaller than the last, through which the powder is sifted; and an immense ground and laboring mill, where it is ground up, while men shovel it in with wooden shovels. The machinery makes a great deal of noise, but the men are silent, as in other houses. The reckless cracking of the machinery even seems to give greater horror, and one is very glad to get out of that house.

The stoving house is the next one on the list, and there the gunpowder is heated on wooden trays. It is very hot, and no workmen stay there. From there it goes to the packing-house, and it is put up in barrels, kegs, and canisters.

Safely through all these houses, it goes at last to the storehouse. One feels like drawing a long breath to see the fearful stuff safely packed away, out of the hands of men, in this curious house.

You've heard of things being as dry as a powder-house, but you wouldn't think this house very dry. It is almost imbedded with water. The roof is one big tank kept full of water. Did you ever hear of a water roof before? Instead of steps to go in, there are shallow tanks of water, through which every one must walk to the door.

In none of these powder-houses is any light ever allowed, except sunlight. The wages are good; the day's work is short, ending always at three or four o'clock. But the men have a serious look, that makes every one think of the danger and glad to get away.

Though curiosity may take a man once to visit a powder mill, he has no desire to go the second time; and he feels all the rest of his life that, for once, he has been very near death.—*American Sportsman.*

Herrings and Wedding Rings.

THE connection between herrings and marriages may not be obvious to all, but the Scottish registers make it clear enough. In the returns for the third quarter of the present year the registrar of Fraserburgh states that the herring fishery was very successful, and the value of the catch, including casks and curing, may be set down at £130,000 sterling, and the marriages were eighty per cent. above the average. On the other hand, the registrar of Tarbet has to report a steady falling off in the fishing at that creek, and, consequently, the quarter passed without an entry in the marriage register. The registrar of Lochgilphead also returns that the herring fishery has been a failure in the loch, and states that this accounts for the blank in the marriage column this quarter. One registrar, in his return for the quarter, reports marriages in his district, "like angel's visits, few and far between"; at the fishing villages it may be put more briefly—no herring, no wedding.

Filters and Filtering.

WATER, wine, spirits, jelly, sirup, tinctures, and a great variety of other fluids, hot and cold, often contain substances which should be separated, in order to render the fluid clear and bright. As regards water filtering, it has become pretty general; but in domestic life there are fluids, such as wine, liquid jelly, sirup, etc., which are required to be made "clear" before they are put on the table. There are various kinds of filters—sponge may be used for watery liquids, cotton for spirituous fluids, and wool for gelatinous fluids and oils. In every well appointed kitchen there are tin or porcelain funnels. For filtering watery fluids it is only necessary to insert, in the choke of the funnel, a conical shaped piece of fine sponge. All such liquids, on being put into the funnel, will pass through the sponge, and become quite clear. When this effect ceases, the sponge must be removed and well cleansed. Vinous fluids are best cleared by filtering through a cone of white blotting paper, shaped by cutting out a circular piece of paper, the diameter of which is twice the distance from the rim to the nose of the funnel, then folding it into half and then one-fourth its size, then folding it into pointed plaits back and forth. When opened, it will fit the funnel, only the edges of the plaits resting against the sides. A filter thus folded will filter much more rapidly than when the paper rests flush against the sides of the funnel.

Wines, etc., poured into this, will run through perfectly bright. In some cases, where the wine is only a little thick from lees, cork, or other mechanically suspended substance, it can be made quite clear by filtering through a wad of white cotton put in the choke of the funnel; and when this answers, it is much quicker than the paper filter. For jelly and oil, wool alone is the proper medium for filtering. The felted wool jelly bag is pretty well known as the best means of clearing calves' foot jelly, and it also answers for olive and other oil. These bags are, however, too expensive to be generally used; hence, they are rarely seen in kitchens. A good substitute for the wool bag is a colander, on the inside of which a new flannel lining should be fitted, made of double stuff. A wad of white knitting wool, put in the choke of a funnel, will do to filter any small portion of such fluids. Many a good glass of port wine has been wasted for the want of a penny paper filter.

PRIVATE GAS MANUFACTURE.—Mr. Symes, of England, has lately patented a portable gas apparatus for small consumers for which important claims are made, and which is described in the *Jour. Soc. Arts.* It consists of a circular box or iron retort with a cover fitting into place like a valve, so that no luting is necessary. In this is placed the gas-making material, which may consist of coal, wood, peat, in fact of any solid combustible house refuse. The retort may be placed and heated in an ordinary stove or kitchen range. The gas formed passes first into a tank of water, where it is deprived of certain impurities. This tank or main is ingeniously constructed with a safety-valve means of regulating the amount of water, and hence the pressure, etc. Thence the gas enters a condenser, at the foot of which is a purifier, and from this passes into a gas-holder and thence to the burners. The construction is said to be remarkably ingenious and simple. The apparatus requires very little attention. The first cost of the apparatus for twenty-five to thirty lights is given as twenty and twenty-five shillings ($5 and $6) per light, the rate decreasing with every increase of light. Made from "slack," the cost of the gas is estimated at twenty-five cents, from coal at $4 50 per tun with 10 per cent. cannel at forty-five cents per one thousand feet. The illuminating power is reported as equal to eighteen candles or more, while the purity of the gas is stated to be perfect.

THE principle suggested by Tresca's experiments on the flow of solid bodies has been applied by M. le Commandant de Reflye to the determination of the pressure in the bore of large guns. A cylindrical hole, bored into the gun, is filled by a block of lead, supported behind by a steel block, through which is a small cylindrical hole. When pressure acts on the lead, a portion of it is forced into the hole in the steel block. The volume of lead found in the cylindrical cavity after the gun has been fired is the measure of the pressure in the bore of the gun.

THE decomposition of paste may be prevented by adding to it a small quantity of carbolic acid. In the same way, the disagreeable smell which glue often has may be prevented. If a few drops of the solution be added to ink or mucilage, they will not mould. For whitewash, especially when used in cellars and such places, the addition of one ounce of carbolic acid to each gallon will prevent mold and disagreeable odors.

GUNPOWDER PRESSURE GAUGES.

[Condensed from *Engineering*.]

AMONGST the various investigations to which the great increase in the dimensions of modern artillery has led, is that relating to the pressure exerted within the bore of the gun by the ignition of the powder charge. The object with which the experiments in this direction were instituted was to determine the kind and quantity of the powder best suited for heavy guns. The following is the method adopted in England for ascertaining the pressure of the gases of gunpowder within the bore of a gun. And to this point additional interest attaches on account of the frequent allusion made by us to the pressures obtained in the 35-tun gun, in our occasional articles upon the subject of that weapon. The Committee on Explosions having the arrangement of the experiments used the Rodman pressure gauge in the first instance. This gauge, we need hardly say, comes to us from the United States, having been devised by Major Rodman, the designer of the cast-iron gun bearing his name. This gauge is shown at Fig. 1, and in using it a hole is drilled through the gun at any point in the bore where it is desired to ascertain the pressure exerted by the exploding charge. Into this hole the tube, A, is screwed, its lower end, which is open, being flush with the bore. The other end is closed with the piston, B, the joint being rendered tight by means of the gas-check, C. The piston carries a knife, D, and upon the knife rests a piece of copper, E, which is held tightly against it by the screw, F. When the charge is ignited, the pressure of the gases on the base of the piston forces the knife into the copper, and the indent produced is held to be the measure of the pressure which has acted upon the base of the piston.

The results, however, which were obtained with this apparatus were so exceedingly variable, that the Committee were led to devise a modified form of pressure gauge in which some of the causes of error inherent in the Rodman gauge were eliminated. The crusher gauge, as it is termed, is shown at Figs. 2 and 8. This apparatus was made in the Royal Gun Factories, and consists of a screw plug of steel provided with a movable base, Fig. 3, which admits of the insertion of a small cylinder or pellet of copper, B, in the chamber, *c*, *d*, *e*, *f*. One end of this cylinder rests against an anvil, A, the other being acted upon by a movable piston, C, which is kept well up to the cylinder by means of a spring, *i*. The copper cylinder is retained in a truly central position within the chamber by means of a small watch-spring, seen at Fig. 5. In order to prevent any possible leakage of gas into the chamber, the head of the piston is fluted, as seen at Fig. 7, as is also the body of the anvil, Fig. 4. Four small holes, *a*, *b*, Fig. 3, communicate with a main vent passing through the upper portion of the plug. Against the lower extremity of the piston a gas-check, D, is inserted. The crusher gauge is used in exactly the same way as the Rodman gauge, being inserted at any required point in the bore of the gun. In the 8-inch experimental gun the pressures are taken at intervals along the whole length of the bore, holes being drilled for that purpose. As the gases expand, following up the flight of the projectile, the pressures become weaker, the reduction gradually increasing towards the muzzle as the expansion increases. The forward gauges are therefore provided with cylinders made from a softer metal than those used at the immediate point of explosion. In the 35-tun gun the pressures are taken at three points, at the end of the bore, at the vent, and at the base of the projectile. The gauge for the end of the bore is placed in the center of a shallow copper pan, which is inserted at the muzzle of the gun and carefully pushed down the bore by means of a detachable rod, the same implement being used to withdraw it after a charge has been fired. The vent-gauge is inserted in the vent-hole, whilst that for the projectile is placed in a hole made in the base to receive it. The gun is fired by electricity, the wires being inserted in the powder charge before it is placed in the gun. To prevent jamming they are laid along a groove cast on the outside of the projectile, both powder and shot being rammed carefully home together. The action of the apparatus is very simple. Upon the explosion of a charge the gas acts on the area of the piston, and crushes the copper cylinder against the anvil. The amount of compression which the copper thus sustains becomes an indication of the pressure exerted upon the piston. The area of the copper cylinder found most suitable for the 8-inch gun is one-twelfth of a square inch, the piston area being just double, or one-sixth of an inch. In order to obtain data whereon to base the calculations of the pressures, a series of experiments were made by means of a testing machine to determine the pressure required to produce a definite amount of compression in copper cylinders, similar to those used in the instrument. The results of these experiments were tabulated, and they furnish a means of comparison whereby the amount of compression produced in the crusher becomes a direct indication of the pressure exerted by the gases at that part of the bore or chamber where the gauge is placed.

FIG. 1.

FIG. 3.

FIG. 4.

FIG. 5.

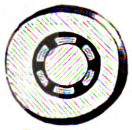


FIG. 6.

FIG. 7.

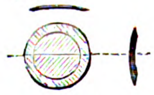


FIG. 2.

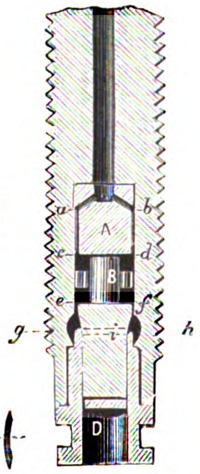


FIG. 8.

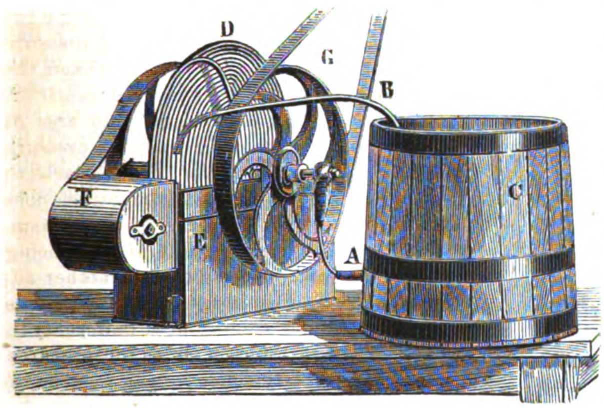
The results of experiments show that the copper disks cannot be depended upon to give a result within 1,500 pounds of the actual pressure, but latterly disks of pure silver have been employed, and the margin of error has been reduced to 7 pounds

It was speedily found by the Committee that much greater reliance could be placed upon the results furnished by the crusher gauge than upon those obtained with the Rodman pressure gauge. This was due to several radical defects inherent in the latter instrument. The shape and size of the Rodman coppers and knives render it imperative to place them at the upper extremity of the plug, and consequently on the exterior of the gun. The gas, therefore, has a considerable space to travel through between the powder chamber and the indicating parts. Thus, before reaching the piston, the gases have attained a high *vis viva*, especially with quick-burning powders. This is transferred to the knife, and the recorded pressures were, therefore, much higher than they should have been. This was shown by placing a copper cylinder in one of the Rodman gauges, and comparing its compression with that of a similar cylinder taken from the crushing instrument. In the case of R. L. G. (rifle large grain) powder, the inner cylinder was compressed from 0·500 inch to 0·285 inch; the area on which the gas acted being 0·167 of a square inch, and the corresponding pressure 22½ tuns per square inch. On the other hand, the cylinder placed externally was reduced from 0·500 inch to 0·251 inch, the gas acting on an area of 0·110 square inch, and the corresponding pressure being 40 tuns per square inch. This obstacle to the attainment of correct pressure indications does not exist in the crusher gauge, as the small diameter of the working parts permits of their being placed near the surface of the bore. Another advantage due to the smallness of the dimensions consists in the readier attainment of uniformity in the quality of the metal upon which the pressures are recorded, as a very much larger number of crusher cylinders than of Rodman plates can be produced from one and the same quality of metal. Nevertheless, as we have pointed out in previous articles, we do not hold the apparatus to be a perfect recording instrument, inasmuch as it is very questionable whether the metal from which the cylinders are made possesses thorough uniformity. To this possible defect, as well as to the probable imperfect action of the piston, we attribute the very wide differences between the results lately obtained with equal charges of the same kind of powder, these differences of pressure ranging from 21·6 tuns to 66 tuns per square inch.

THE HOOSAC TUNNEL was begun some eighteen years since. Sometimes its progress has been so slow that it has been almost completely lost to the public notice, and repeatedly its prospects have lived a precarious life in the halls of legislation. Especially in 1872, a strong, combined effort was made to defeat the project, though, after a long and animated discussion, it was finally decided by a considerable majority in both Houses to pledge the credit of Massachusetts for the sum then needed—a pledge it has been frequently called upon to renew. However, since the Messrs. Shandly entered upon their contract, three years ago, the work has been pushed forward with great vigor and determination, and it is calculated now that the excavation will be completed the entire distance of four and a half miles by the 1st of March, 1874. It is sufficiently wide for a double track, and railroads are in running order on both sides. It is understood that Tweed, the great despoiler of cities, has supplied the capital—about $1,000,000—necessary to complete the work. Thus it is that the money of our citizens is made to support the enterprises of neighboring States.

DYNAMIC REFRIGERATOR.

Mr. J. B. Toselli, of 236 Rue du Faubourg Saint Martin, Paris, has invented a cooling machine which he calls the "Dynamic Refrigerator." It consists of a revolving disk, D, formed of a metallic tube bent into a complete spiral, having one end open, and with the other end communicating by a hollow shaft or axis of rotation with an external tube, A, communicating with a worm contained in a separate vessel, C, and terminating in a discharge pipe, B, with outlet into another vessel, E, containing the revolving disk to which a slow movement of revolution is imparted by a driving pulley and belt, G, making, say, one turn in a second of time. The disk is half immersed in cold water, and as the exterior surface of the disk above water is continually wet, it exposes considerable evaporating surface. At the same time a continuous stream of water is forced through the hollow spiral, parting with some of its heat under the influence of the external evaporation and radiation, which is intensified by the addition of a ventilator, F.



The current being thus lowered in temperature, refrigerates in its turn the liquid to be cooled in the vessel, C. The lowering of temperature thus obtained varies according to the hygrometric condition of the atmosphere; the minimum effect obtained under the most unfavorable circumstance amounts only to a difference of five to six degrees Fahrenheit; while the maximum difference obtained in sunlight is between 32 and 33 degrees Fahrenheit.

This machine is obviously calculated to be of great service in many manufacturing processes—such as for brewing, distilling, and effervescent beverages—also in hydro-therapeutic establishments; and probably also on shipboard for the evaporation and distillation of sea-water, and its conversion into a potable fluid.

Cure for the Opium Habit.

In a recent report on the condition of the English Hospital, at Pekin, China, the attending physician gives a formula for "anti-opium pills." This remedy is composed of extract of hyoscyamus or henbane, extract of gentian, camphor, quinine, cayenne pepper, ginger, and cinnamon, with castile soap and sirup to form the mass, and liquor ice powder to form the coating. The efficacy of these pills in overcoming the opium habit, and in preventing the suffering on giving up the use of that poison, is stated to have been proved in numerous cases. The native remedies it is said contain opium in some form, and most frequently the ashes of opium already smoked, and consequently are inefficacious, it being as difficult to discontinue the use of the medicine as of the drug itself.

TESTING TELEGRAPH INSULATORS.

From *Engineering*.

Insulators usually undergo a most careful visual investigation at the factory, and all such insulators as are free from mechanical defects subsequently have to pass through a most delicate system of electrical testing, in order to prove that they are electrically sound, and are really insulators. In spite of all the precautions taken, however, bad insulators do show themselves on land lines. Whether they have escaped the searching tests, or have become bad after being put up, such is the case, and a great loss of the electric current is due to the presence of bad insulators on a line—contributing to much bad working.

In order to detect a faulty insulator without the necessity of removing it from a pole, the following plan has been arranged by Mr. Louis Schwendler:

The principle of the plan is to produce a series of electro magnetic currents, pass them through the defective insulator, and to measure these currents by the effect they produce upon the body of the person engaged in the testing operation. The annexed diagram will show the arrangement of the wires and the details of the test.

M is a small magneto-electric machine connected from one pole by No. 1 wire on to the insulator to be tested, and from the other terminal to the upper part of the small key, K, and also to the platinum stud, *f*, in C. The lower part of the key is connected to the insulator bolt and bracket; by pressing the metallic key with its platinum stud, *f'*, contact is broken between the points at *b*.

It is necessary that the wire No. 1 should be well insulated, so that no leakage beyond that due to the insulator itself can interfere; the No. 2 wire should also be well insulated. Before testing the insulator, it should be properly cleaned, and a temporary disconnection made between it and the line wire; this should of course be done before the connection in the diagram can be made.

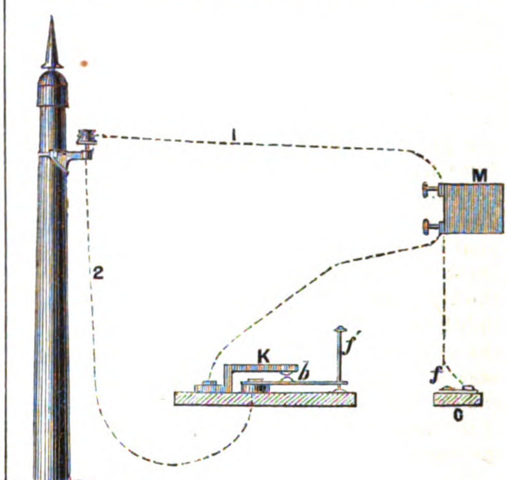
If the handle of the magneto machine be turned and currents produced, it will be seen that if there is any leakage through the insulator the currents must pass through 1 and 2 wires, and, by means of the contact at *b* and K, back to the machine; the slightest pressure on *f'* will at once interrupt the circuit, but if the key, *f'*, be pressed by one finger, and the stud, *f*, in C, by another finger of the same hand, the circuit will again be closed through the hand. And if there be any leakage, the slight positive and negative currents due to that leakage (forming a circuit) will be felt as shocks from the machine, in a greater or lesser degree, according as the leakage is more or less. The amount of these shocks, and of course the whole management of the test, is in the hands of the one experimenter, who, whilst carefully feeling for the shocks with one hand, is with the other moderating the revolutions of the machine to the requirements of the case.

It does not follow that, because no shocks are felt, the insulator is perfect. There is one more test which the experimenter can perform, but which should not be done until the finger test has failed. When such is the case, let one finger remain on *f* and touch *f'* with the tongue; if no shock be then felt, the insulator may be passed as perfect, as the electro-sensitiveness of the tongue must be considered as very great.

To give a practical test of the value of the finger and tongue when applied to such a purpose Mr. Schwendler made some tests on some insulators (whose resistance had previously been accurately measured), using the currents produced from one of Siemens's magneto-alphabetical instruments.

No. of insulator.	Resistance in Siemens units.	Force of the Magneto-electric Currents across the Insulators measured by the Human Body.
1	110	Strong shocks felt by the fingers.
2	130	" " "
3	145	" " "
4	190	" " "
5	750	Slight shocks felt by the fingers.
6	2,300	Shocks no longer felt by the fingers, but strongly by the tongue.
7	5,700	The tongue no longer feels shocks, but a strong acid taste.
8	7,100	Taste of acid distinct, but slight.
9	8,200	" " "
10	82,000	The tongue no longer feels anything.

From the above experiments it will be seen that up to 1,000 Siemens units shocks may be felt by



means of the fingers, and beyond that and up to 8,000 the loss of insulation can be detected with the tongue—an instrument which Mr. Schwendler considers the best for discovering faults of want of insulation, because it is sufficiently sensitive never gets out of order, and, besides, is the least expensive instrument that one can employ.

Staining Ivory.

Black.—Lay the article for several hours in a strong solution of nitrate of silver, and expose to the light, or boil the article for some time in a strained decoction of logwood, and then steep it in a solution of acetate of iron. An easier method: immerse frequently in ink until of sufficient depth of color.

Blue.—Immerse for some time in a dilute solution of sulphate of indigo, partly saturated with potash; and it will be fully stained.

Green.—Boil in a solution of verdigris in vinegar until the desired color is obtained.

Red.—Dip the articles first in the tin mordant used in dying, and then plunge into a hot decoction of Brazil wood—half a pound to a gallon of water—or cochineal, or steep in good red ink until sufficiently stained.

Scarlet.—Use lac-dye instead of the preceding.

Violet.—Dip in the tin-mordant, and then immerse in a decoction of logwood.

Yellow.—Impregnate with nitro-hydrochlorate of tin, and then digest with heat in a strained decoction of fustic, or steep for 24 hours in a very strong solution of the neutral chromate of potash, and then plunge for some time in a boiling solution of acetate of lead.

Horn and bone must be treated in the same manner as ivory for the various colors given above.

Alloys.

M. GURTTIER, in his work on "Metallic Alloys," gives the following directions, which are very valuable, as they are the results arrived at after large experience :—

1. To heat the crucible to a red or sometimes a white heat, and then to melt the *least* fusible of the metals composing the alloy. After fusion, to heat this metal to such a heat that it will bear the addition of the next least fusible metal without too great a reduction of temperature.

2. To introduce the metals into the pot strictly in the order of their resistance to fusion, each metal being properly melted before the next is added. The danger in first melting one of the most fusible metals lies in the fact that it would most probably volatilize and become oxydized; and this would be a source of great waste.

3. To heat each charge of metal thoroughly before adding it to the pot, thus avoiding as far as possible the reduction of the temperature of the metal in the crucible.

4. When the proportion of zinc is large, and some of the component metals have a high point of fusion, the alloys should be covered with a layer of charcoal dust. If the alloys are rich in tin, the surface of the melted metal should be covered with sand.

5. To stir the metal before casting, and if possible when casting, with a white-wood stick; this is much preferable for the purpose to iron.

6. If possible, to add a small proportion of old alloy to the new one. If the alloy is required to make sharp castings, and strength is not a very great object, this proportion of old alloy to the new should be increased. In all cases a new or thoroughly well cleansed crucible should be used.

The Henderson Process for the Removal of Phosphorus from Iron.

THE inventor claims that by this process phosphorus may, as a rule, be removed from all kinds of British pig-iron that are smelted from ores (as distinguished from cinder pig smelted from common puddling furnace cinder) in sufficient amount to render the iron pure enough for steel. This fact was, on the authority of the *Chemical News*, demonstrated by trials at the Blockhairn Ironworks in Glasgow. At a trial made on December 23 last, No. 4 Dalmellington pig-iron was treated, the analysis of the pig-iron and results as regards phosphorus by Mr. Edward Riley are :—

Pig-iron, phosphorus per cent.	1·14
Refined cast-iron 30 mins. after fusion	0·23
" " 40 " "	0·15
" " 50 " "	0·12
Wrought-iron	0·07
The cinder	0·52

360 lbs. pig-iron, 100 lbs. ilmenite, 10 lbs. manganese, and 42 lbs. of fluoride of calcium were used.

The complete analysis of the cinder is—

	Per cent.
Silicia	11 12
Titanic acid	5·02
Protoxyd of iron	56·41
Peroxyd of iron	18·20
Alumina	1·73
Protoxyd of manganese	2·22
Lime	3·51
Magnesia	0·43
Phosphoric acid	1·19
Sulphur	0·09
Nickel	trace
	99·92
Metallic iron	56·62

The pig-iron smelted from cinder of the above composition will contain all the phosphorus in the cinder, which will be 0·87 per cent. in the pig-iron, or 0·27 per cent. less than the original pig-iron smelted from ore.

It is obvious that as the phosphorus is not all in the cinder that was removed from the iron, it must have become volatilized. It is worthy of remark that the calcium and manganese have also been volatilized. The journal referred to states that iron (No. 1 or puddled bar rolled direct from bar or bloom as taken from the furnace) made on the 7th inst., in the presence of a committee of scientific men, has been tested at Mr. David Kirkaldy's works, and found to stand a higher test than any iron previously examined.

Cars to Run Through an Iron Tube under Water.

THE railroad bridge which has been planned to extend across San Francisco Bay, from the mainland to Goat Island, respecting which so much opposition is manifested by the citizens of San Francisco, on the ground that it will materially injure the harborage of the port, is of a subterranean character. It is an immense iron tube intended to be sunk from twenty-eight to thirty feet below the surface, and held in its place by its own buoyancy and by cables and mushroom anchors. The tube is to be twenty feet in diameter, and made of boiler iron, strengthened by an internal framework of iron beams. The invention is based upon the idea that the buoyancy of the tube will be equal to the weight of a train of cars. Anchors are to hold the tube in place.

Increase of Rain beyond the Mississippi.

THE *Business Guide*, Cincinnati, states as a curious fact that as the settlements spread beyond the Mississippi rains increase both in frequency and amount of water. Many beds of streams, which were uniformly dry in summer only ten years ago, are now full through the year. Travelers over the Laramie plains were once destitute of vegetation; now they have a luxuriant growth, and will raise large crops of wheat. Denver was built on the banks of an extinct creek, perfectly dry. Now it is full of water, and needs to be crossed by bridges. Salt Lake is seven feet higher than ten years ago, and it is steadily rising. The vast plains which engineers once pronounced uninhabitable and fit only for droves of buffalo, because destitute of streams and springs, may yet become great States, the home of a crowded population.

Ohio Iron and Coal.

WE take the following from the first report of the managers of the Lake Shore and Tuscarawas Valley Railroad to the stockholders :—

The very large deposits of black-band ore in the county of Tuscarawas will soon be the source of great wealth, if we may contrast the extent of the deposits of this valuable ore in that county and in Scotland. In Scotland the black-band ore occurs in beds of from three inches to three feet in thickness. The average thickness of its beds is not greater than from twelve to eighteen inches, and, occurring at considerable distances below the surface, the expense of shafting, pumping, ventilating, and hoisting must be incurred in Scotland in mining it. The black-band ore in Tuscarawas County occurs in a horizontal stratified bed, 4 to 13 feet in thickness. Appearing near the summit of hill ranges, and 150 to 200 feet above the valley levels, it can be mined by horizontal drifting. The amount of pig-iron exported from Scotland to foreign countries in 1870 was 655,000 tuns, an amount three times as great as the entire product of the State of Ohio, and equal to one-third of the entire product of the United States; and, in addition to the amount exported, Scotland used 505,000 tuns of her own production—making a total of the production in Scotland in 1870 of 1,160,000 tuns. Of 7,100,000 tuns of iron imported from Great Britain into the United States in twenty years, from 1850, more than three-fourths was black-band ore from Scotland. Estimating the iron to have brought the British manufacturers three pounds ten shillings per tun, the people of the United States have paid to them in the twenty years $133,125,000. A writer says:—"The possession of black-band ore deposits enables Scotland to dictate terms to even foreign markets that she can reach. It has call'd forth a new era of industry, progress, and enlightenment. It has raised up from bleak and barren moors mighty manufacturing centers, belching with flames of blast furnaces, resounding with the roar and roll of machinery, teeming with restless industry!" We have quoted the remarks to show what inexhaustible wealth we have in the very large deposits of black-band ore in the Tuscarawas Valley on the line of the road, and how productive the capital invested in its development by the erection of furnaces must be made. This great mine of wealth cannot long be neglected. We can hardly overestimate the value of this ore and iron to the freight traffic of this road. The district in Scotland from which the black-band ore is obtained is not larger than the county of Tuscarawas, Ohio.

Jones's Meat-preserving Process.

FROM a paper read before the Society of Arts, by Richard Jones, Esq., are obtained the particulars of a system upon which he has been engaged for the last few years, which, having now been taken up by some manufacturers, may be said to be fairly launched before the public. We give the details of the process in Mr. Jones's own language:

Before going into these details, I wish to say one word relative to a process recently attempted of cooking meat by the chloride of calcium process, and preserving it by chemical agency. It is simply a modified form of the applications previously used, and partakes of their drawbacks. The advantages which I claim for meat preserved by my system are—

1. That it is not overcooked, and loses none of its nutritive qualities.

2. That when turned out of the tins it is not to be distinguished from that cooked in the ordinary mode, by the kitchen fire or in the oven, is pleasing to the eye, and cannot offend the most delicate palate.

3. That the system is exceedingly simple, and entirely free from any foreign agents.

4. That it is in accordance with scientific knowledge, and founded on well-known natural laws; and can only fail through the neglect or incapacity of the operator.

5. That it is equally applicable to all kinds of food, products of every country being quite unaffected by climate.

Having stated these advantages, I must endeavor to make you acquainted in detail with the means adopted in preserving by my system. The tins are filled with the raw material, and placed in a bath, either of boiling water or of chloride of calcium, as may be desired. Before being immersed in the liquid, they are attached by means of a tube soldered to the cover, and joined to a tap communicating with a vacuum chamber. In my first experiments I used a Torricellian vacuum. I, however, found that Messrs. Forbes, of Aberdeen, who have adopted my system, for greater con-

venience, prefer creating their vacuum by means of steam, condensing the same by jets of cold water. On the tins being attached, as described, to the tap, so that, with their contents, they are in immediate communication with the chamber, all the air being drawn into it, they are then immersed in the liquid, at a low temperature, which is gradually raised to 270° Fahr. The operation then going on resembles as nearly as possible the cooking in an ordinary kitchen oven. The tins form the oven, the liquid is the heating medium used instead of the fire, and in consequence of the vacuum applied, the steam and moisture ascends into the chamber, where it is condensed. The vacuum is used to remove moisture, and any germs and decomposing gases which might be prejudicial to the preservation, but it must be used after the first half hour very sparingly, otherwise too much heat may be abstracted, or the food may be too much dried, and would, consequently, burn in the oven. The time necessary to cook and preserve a duck in this manner is about two hours. It will be seen that nothing escapes from the tin save the air and water.

As to the appearance of the food when turned out, I can only refer you to the specimens on the table, some of which I think you would be at a loss to distinguish from food prepared in the usual manner.

My third claim does not require any further proof than the short description of the operation which I have given; and I regret it has not been in my power to show its actual working, when I doubt not that its simplicity would be admitted, as it has already been by those who have inspected it.

The system is in accordance with scientific knowledge, and founded on well-known natural laws. Tins of meat preserved on this principle have been round the globe without any one becoming decomposed, and of many sent out to Australia (all of which were good) one obtained the highest prize medal at the Sydney Exhibition, New South Wales. The expense of preserving is rather lessened than increased in consequence of the shorter period taken in effecting the object.

Telegraphy without Insulation.

THAT rather visionary gentleman William H. Highton, whose discussions upon the indefinite multiplication of power from galvanic batteries, and whose protests at the coldness with which his speculations were received by learned societies, have procured him some present *éclat*, is again before the public, with a proposition which, though not quite so unscientific as his former dreams, is still sufficiently wild to sustain his reputation.

The following summary of a paper recently read before the Society of Arts is given in an English exchange :—

On Wednesday last, Mr. W. H. Highton read a paper on this subject at the meeting of the Society of Arts. He gave an account of the experiments which he had tried both on long lengths of naked submerged wire and on artificial cables, and the conclusions which he drew from them. He showed by experiment that water itself is for electricity of low tension so perfect an insulator, that a long wire on a plate of copper charged with electricity of low tension will retain the charge even for hours—indeed, quite as obstinately as the glass of a Leyden jar retains a charge of high tension. The instrument he proposed to use for submarine telegraphy is a light slip of gold-leaf, weighing from 1-500th to 1-200th part of a grain, acted on by a powerful electric magnet, and with its motions optically magnified. The delicacy of this is so great that simply looking at a thermopile will transmit a visible signal through the resistance of the Atlantic Cable, and a kiss or grasp of the hand a very strong signal; so that a modern Pyramis and Thisbe might exchange salutations, not through a hole in the wall, but through the breadth of all the waves of the Atlantic. The use of this instrument gives an opportunity of using electricity of the very lowest tension, which, besides its other advantages, has a much less tendency to escape by faults in the wire. It was shown that a fault which caused the disappearance of all visible signals through Thomson's speaking galvanometer, with a resistance of 500 units, or about 125 miles of the Atlantic Cable, would still allow intelligible signals to be transmitted on this instrument with 10,000 units, or 2,500 miles of resistance. The other advantages were the absence of all swing, such as there is in a needle, and an instantaneous movement, in spite of electro-static induction. Where it requires two or three seconds for the wire to accumulate sufficient charge to overcome the initial friction in any instrument where there is any friction, however slight, which he proceeds to move at intervals of seconds by jumps, the gold-leaf having no friction begins to move instantaneously, and proceeds by an equable motion. Again, where increased sensitiveness is required, the only thing necessary is to increase the force of the electro-magnet at the receiving end. The conclusion the author drew from his experiments was that instead of the hundreds of thousands of units of insulation of the present cables, it would be quite feasible to work through a cable having only a single unit of insulation; or, if greater insulation were desirable, a wire might be used presenting much more resistance to the currents—such as steel wire possessing more strength and cheaper than copper, and that electro-static induction, being less injurious, much cheaper, with less gutta-percha, cables might be used costing some fifth or sixth of the present prices, and thus telegraphy might be made much cheaper and more available for hundreds of thousands of poor emigrants, instead of being the luxury of rich merchants, or speculators, or government officials.

Varnish to Imitate Ground Glass.

To make a varnish to imitate ground glass, dissolve 90 grains of sandarac and 20 grains of mastic in two ounces of washed methylated ether, and add, in small quantities, a sufficiency of benzine to make it dry with a suitable grain—too little making the varnish too transparent, and excess making it crapy. The quantity of benzine required depends upon its quality—from half an ounce to an ounce and a half, or even more; but the best results are got with a medium quality. It is important to use washed ether, free from spirit.

How Summer Suits should be Washed.

SUMMER suits are nearly all made of white or buff linen, pique, cambric, or muslin, and the art of preserving the new appearance after washing is a matter of the greatest importance. Common washerwomen spoil everything with soda, and nothing is more frequent than to see the delicate tints of lawns and percales turned into dark blotches and muddy streaks by the ignorance and vandalism of a laundress. It is worth while for ladies to pay attention to this, and insist upon having their summer dresses washed according to the directions which they should be prepared to give their laundresses themselves. In the first place, the water should be tepid; the soap should not be allowed to touch the fabric; it should be washed and rinsed quick, turned upon the wrong side, and hung in the shade to dry, and when starched (in thin boiled, but not boiling starch) should be folded in sheets or towels, and ironed upon the wrong side as soon as possible. But linen should be washed in water in which hay has been boiled, or a quart bag of bran. This last will be found to answer for starch as well, and is excellent for print dresses of all kinds; but a handful of salt is very useful also to set the colors of light cambrics and dotted lawns; and a little beef's gall will not only set, but brighten, yellow and purple tints, and has a good effect upon green.

SURFACE ELECTRICITY.—M. Terquem has recently made some experiments for further elucidating the fact that the exterior surface of a hollow body is alone affected by electricity. Faraday showed that a small animal, placed inside a cylinder of wire gauze, was not incommoded when the cylinder was so highly electrified that sparks were freely given off by it. He also constructed a room, twelve feet in each dimension, of metallic wire, and suspended it by ropes of silk; and he found that, occupying this room, with electroscopes and electrometers at hand, there was not the slightest indication of electrical action inside the chamber, even when sparks of considerable length were given off by the metal of which it was made. M. Terquem verifies these results by taking a metal bird-cage and suspending it to an insulated conductor of an electrical machine. While sparks sufficient to indicate a highly charged electrical condition were obtained from the exterior, pitch balls, feathers, and even a gold-leaf electroscope remaiedn unmoved inside. Two bundles of linen yarn were hung, one outside and one in; the inside one was unaffected, while the outside was excited, the threads diverging from each other and giving out sparks.

CENSUS OF 1870.—The census of 1860 gave the total property values of the United States at \$16,000,000,000. The census of 1870 makes a return of nearly \$32,000,000,000. Thus the wealth of the nation had about doubled itself in a decade, during which the country was convulsed by a great civil war, involving an expenditure, to both sides, of not less than \$6,000,000,000, and a vast destruction of life and property. Seven years after this terrible struggle, the total of national, state, county, and municipal debts is only \$3,271,874,768, and the country sustains a total tax of \$688,520,435. These figures give an impressive idea of the financial strength and wonderfully rapid development of the United States, in view of which the national debt seems a light affair. The showing is the more remarkable when we reflect that this debt has been reduced at a rate that would extinguish it in twenty years, while permitting yearly reduction of taxation.

FREEZING BY MECHANICAL ACTION.—M. Foselli has announced to the French Academy of Sciences that he has succeeded in producing an amount of cold just below the zero of the Fahrenheit scale by simple mechanical action creating rapid evaporation. He employs a wheel formed of a spiral tube, both ends of which are open, set vertically and half immersed in the fluid to be cooled, so that the latter passes constantly through the whole length of the tube, half of which is constantly above the liquid, and, being wet, gives rise to active evaporation and consequent refrigeration within it.

Nature of the Action in Galvanic Batteries.

PROF. G. W. HOUGH, director of the Dudley Observatory at Albany, N. Y., an industrious and able investigator, has, according to the *Journal of the Telegraph*, made a series of experiments on galvanic batteries, extending over several months, for the purpose of investigating the cause of the decline in the strength of the electric current after the battery has been in operation for a long period. It is well known that, since the invention of the American method of recording transits, the galvanic battery has become one of the necessary instruments in every first-class observatory. The application of electricity also to the registration of meteorological phenomena makes it desirable to secure the best form of battery, as well as to be able to know what is the difficulty when the battery begins to fail in its work. Some of the leading conclusions reached by Prof. Hough were as follows:—

1st. In the sulphate of copper battery (Daniells form) the principal cause of decline in the strength of the electric current is due to the formation of sulphate of zinc.

2d. The quantity of electricity flowing in the external circuit depends upon the specific gravity of the sulphate of zinc.

3d. When the sulphate of zinc approaches saturation, polarization takes place in the battery itself; and, although the electro-motive force remains the same, the internal resistance may be increased more than a hundred times.

4th. The sulphate of zinc (or any fluid about the zinc) is only useful as a conductor of electricity.

5th. The copper, or negative metal, is useful only as a conductor, since it may be replaced by any other metal, even zinc itself.

6th. The internal resistance of the battery has been separated into two parts, viz., that due to the porous cell and that due to the liquids employed. The specific resistance of the liquid was found to be 13; that for a small clay cell, 17; and for a leather cell, 7. Since the resistance of the leather cell is less than one-half that of a clay cell, it has been used in the construction of batteries at the observatory, as the quantity of electricity is nearly doubled without any increase of surface. For the negative metal, in place of the copper hitherto employed, we have used sheet-lead.

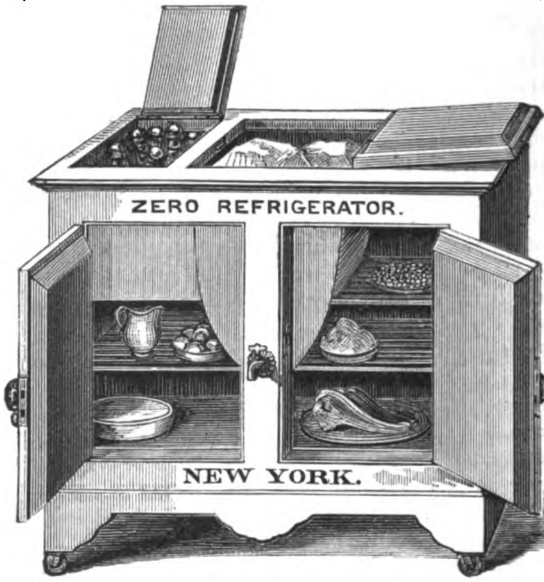
These investigations have rendered it possible to compute, with great precision, the length of time a battery will generate its normal quantity of electricity, provided the amount of electricity flowing in the external circuit is known, and the capacity of the vessel holding the sulphate of zinc is determined. The specific gravity of the sulphate of zinc should not be less than 15 or more than 38 degrees Baumé.

A new mechanism for the more thorough investigation of galvanic batteries has been devised by Prof. Hough, but not yet constructed, by which the quantity of electricity flowing in the external circuit will be recorded in the form of a curve so long as the battery is in action. This subject is one of great interest and importance, and it is proposed by Prof. Hough to continue his investigation as circumstances may permit.

MILDEW IN BOAT SAILS.—A safe plan is said to be to dry the sails thoroughly, in the open air if practicable, and to sweep them well on both sides with a strong hair brush, having sprinkled it beforehand with water in which a little ammonia has been dissolved. Do not roll the sails up while wet, as it is damp which has produced the mildew. To disinfect sails, or prevent infection, carbolic acid is good.

Lesley's Zero Refrigerator and Spa Cooler.

THE accompanying engravings illustrate improved refrigerating devices, invented by Mr. Alex. M. Lesley, 224 West Twenty-third Street, New York. The name "Zero" is a trade-mark



LESLEY'S ZERO REFRIGERATOR.

registered through the "American Artisan Patent Agency."

This refrigerator is an improved form of the well-known Zero refrigerator. It is made of well

seasoned lumber, and is filled in with charcoal. The lining is of zinc, and it is provided with tinned wire shelves, silver-plated faucet, and casters.

The ice is placed in the center of the refrigerator through the top door, on a wooden rack several

inches above the faucet. No communication is allowed between the ice and provision chamber, and *no hot air is allowed to touch the ice*, except as the door is opened for putting in more ice. The ice being thus protected, will last longer than in the ventilating refrigerators, which are great consumers, while they at the same time introduce warm, moist air into the provision chamber, which induces nastiness, decay, and bad odor. The drippings of the ice are retained and drawn off from the faucet. Housekeepers will be pleased with the arrangement, as there is no water running over the floor. When the ice is kept clean, and the wooden ice-rack boiled so as to remove the taste, the ice-water can be used as in the ordinary water-cooler. Persons using this refrigerator in warm climates, where ice is very expensive, will make a great saving in amount of ice consumed.

The moisture which condenses on the cold surface of the ice-box runs down into a trough, and is conveyed away through a pipe at the bottom, where a small dish receives it. No moisture collects on the zinc lining. The provision chamber is thus kept so dry that it is claimed even matches may be kept therein without injury from dampness.

The "Spa" cooler is designed for use by all persons using the "siphons" in private use, or by druggists and in hotels. It can be used for the sick-room and for nursery purposes. From one to four bottles of milk or wine can be cooled, and at the same time ice-water can be drawn from the silver-plated faucet. The inside lining is made of galvanized iron. The filling is of charcoal. The outside is made of tin, handsomely japanned and ornamented. For persons intending to pass the summer at watering-places, or boarding at hotels in country or city, one of those coolers will be found a great convenience. The bottles or "siphons" are placed in a caster like that used for holding decanters, and placed upon pounded ice contained in the bottom of the cooler. A cover is then placed over them, as indicated in one of the engravings. The other engraving shows the cover removed. This arrangement is exceedingly convenient, and the cooler is very tasty in appearance.

Further information may be obtained from the manufacturer, whose address is given above.

The Correct Weight of Milk.

MR. GAIL BORDEN, of White Plains, N. Y., who conducts an establishment for preparing condensed milk, has been making some experiments for the purpose of determining the correct weight of crude milk. He took the milk of several cows, and, mingling it together and then thoroughly cooling it, he carried it directly to the "U. S. Sealer of Weights and Measures," who measured and weighed the milk by accurate Government weights and measures. The result was that a quart of milk, so measured and weighed on delicate scales, was equal to two pounds two ounces and one-quarter of an ounce (2 lbs. 2¼ ounces). The tests were made with different samples of milk at different times, but without materially altering the weight. Mr. Borden has adopted the above as a true weight of a quart of milk having a fair average quality. Hence, any person who buys milk may determine by weight, with satisfactory accuracy, whether he receives a quart when he is required to pay for that quantity.

Safe Poison-bottles.

THE following resolution has been adopted by the College of Physicians, Philadelphia:—That it is recommended to all druggists to place all external remedies in bottles not only colored so as to appeal to the eye, but also rough upon one side, so that by the sense of touch no mistake shall be possible even in the dark; and that all bottles containing poisons shall not only be labelled "poison," but also with another label indicating the most efficient and convenient antidote.

AMERICAN ARTISAN

BROWN & ALLEN, Publishers,

ISSUED WEEKLY AT

No. 189 Broadway, New York.

H. T. BROWN. L. ALLEN.

AGENTS.

AMERICAN NEWS COMPANY, New York City; NEW YORK NEWS COMPANY, New York City; NEW ENGLAND NEWS COMPANY, Boston; A. WINCH & Co., Philadelphia; H. TAYLOR & Co., Baltimore.

WEDNESDAY, JUNE 12, 1872

CONTENTS OF THIS NUMBER.

[Illustrations are indicated by an asterisk.]

THE REPORT OF THE ROYAL COMMISSION ON THE ENGLISH PATENT LAWS.

As most of our readers are aware, a lively discussion as to the merits and demerits of the English patent laws, as well as the propriety of abolishing these laws, has been going on in England for a considerable period. Patents or no patents has been the question on which two adverse parties have arrayed themselves. Among the prominent disputants who have taken the negative side in the debate are Mr. Mcfie and Sir William Armstrong. They were opposed by Mr. Bessemer and others, who as strongly advocated the utility of patents.

A wonderful deal of nonsense was uttered on both sides, but it seems there was an under-stratum of good sense and sound logic brought to bear on the affirmative which has decided the Parliamentary Committee to report in favor of continuing the system in its essential features. They decide—

That the privilege conferred by letters-patent promotes the progress of manufactures, by causing many important inventions to be introduced and developed more rapidly than otherwise would be the case. That the same privilege leads to the introduction and publication of numerous improvements, each of a minor character, but the sum of which contributes greatly to the progress of industry. That in the absence of the protection of letters-patent, the competition of manufacturers amongst themselves would, doubtless, lead to the introduction of improved processes and machinery, but that it would probably be less rapid than under the stimulus of a patent law. That it does not appear that the granting of pecuniary rewards could be substituted with advantage to the public interest for the temporary privilege conferred by letters-patents.

They, however, in their report make some important suggestions, which may be summed up as follows:—

They state that the most prominent defect in the present system is the want of proper examination, which results in the patenting of many inventions several times over, or in granting patents upon alleged improvements which have been for a long time public property. They recommend as a remedy for this that a competent tribunal of scientific, technical, and legal experts be formed to examine and decide upon applications for patents.

They also think it desirable that there should be more uniformity in the different nationalities, and to that end recommend that the English Government should signify its willingness to concur in an international system.

They are of opinion that protection for a limited period, and dating back to the time at which it is applied for, should only be granted for an invention on its nature and particular points of novelty being clearly described in a provisional specification, and upon the report of a competent authority that such invention is, so far as can be ascertained, new, and a manufacture within the meaning of the law.

They further recommend that letters-patent be made subject to the condition that the manufacture shall be carried on within the United Kingdom, so as to fully supply the demand for the same on reasonable terms to the public.

Many will doubt the propriety of this suggestion. We think it goes altogether too far. It should be sufficient, if the manufacture of the articles patented is insisted upon, that the inventor makes a reasonable effort to supply the demand. To require that the demand shall be fully met would in many cases entail great hardship and injustice, as misfortune would often place an inventor without capital at the mercy of rich manufacturers. The following we regard as excellent suggestions:—

That letters-patent shall not be valid for an invention which has been in use in a foreign country, unless a patent for the same shall have been granted in such country, *and unless such letters-patent shall have been granted in England to the original inventor, his assignee or authorized agent.* That the duties payable on patents should be so adjusted as to encourage inventors to the utmost to make known their inventions, and that their primary application should be to the purposes of a complete and well-organized record of industrial progress, and to an improved establishment for the conduct of patent business. That no person concerned in the administration of the patent law should have a pecuniary interest in the number of patents applied for, granted, or refused. That inasmuch as the property created by the patent law, and the questions arising under it, are peculiar, the tribunal for deciding contentious matters in reference thereto should, both as to its constitution and procedure, be adapted to these peculiarities.

That in the case of several concurrent applications for a patent for the same invention, the patent be granted to the first applicant, unless it be shown to the satisfaction of the proper authority that he is not the first inventor. That all trials of patent causes should be before a judge, with the assistance of skilled advisers (who may be Commissioners of Patents), and, as a rule, without a jury; but with power for the court to order a jury for the ascertainment of facts in exceptional cases requiring the same.

On the whole, we regard the report of this committee with peculiar satisfaction. Having long and patiently investigated the working of the patent system with a view to arrive at the truth, having examined a very large number of witnesses, and listened to the opinions of those best qualified to give opinions *pro* and *con*, they emphatically approve the granting of patents as a wise and beneficent policy. The report will probably terminate an interesting and important, though a somewhat wearisome discussion.

THE DUTY ON SILK.

MR. WELLS has recently given an exhibition of his ability as an arithmetician; be it ours to show him up as a sophist.

Since the year 1864, he states, the duties on the importation of silk have averaged 60 per cent. *ad valorem.* Right, Mr. Wells. The annual value of silk consumed, domestic and foreign, he assumes to be $30,000,000, which we admit to be about the proper figure. This amounts in eight years to $240,000,000. Mr. Wells evidently knows the multiplication table, and has some skill in percentage, since he computes the total duty on the above aggregate to be $149,000,000, which he asserts the American people have paid for their silk more than it would have cost them without the duty.

Now, Mr. Wells, having performed his problem, proceeds to draw an inference. All we have to show for this increased cost of silk—$144,000,000—is, he says, a silk industry in which only $25,000,000 are invested, and 10,000 operatives are kept employed.

If we are not mistaken, no one knows better than Mr. Wells that the primary object of the high tariff on silk was to derive revenue for the support of our Government in a time when it has needed all its resources. That our silk industry has been encouraged by this tariff is purely an incidental result, not unexpected, though it was not, and never has been, regarded as of sufficient importance to justify a tariff like that of which Mr. Wells complains. As a measure for deriving revenue this has proved one of the wisest; that it protects and fosters a small industry is all Mr. Wells will acknowledge for it in public. Assuredly Mr. Wells is a sophist.

KILLING BY KEROSENE IN BROOKLYN.

OUR sister city of Brooklyn has had its full share of kerosene horrors, resulting, we suppose, from the fact that it has more than its share of fraudulent and unprincipled dealers, and that its suburban tenements are, many of them, still unsupplied with gas. Indeed, the quality of the gas furnished to consumers in that thriving town is so inferior that the kerosene light is preferred by many who have the gas service in their houses.

The record of accidents through the use of kerosene has indeed been a fearful one, and we are glad to learn that the city officials are beginning to take action to enforce the law prohibiting the sale of dangerous lighting fluids.

The law of 1865 provides that dealers in petroleum burning fluids must be licensed, and prescribes penalties for every sale without a license. For every sale of petroleum fluid having a flashing point of less than 110° Fahr. it prescribes a penalty of $150. It provides for the appointment of a special warden, who shall have the power to enter any place where kerosene is sold to inspect

and test the quality of the article. The salary of this officer is fixed at $1,500 per annum, which is only about one-fourth what it should be. The services of a man who is morally and technically qualified to hold such an office as this are cheap at $6,000 per annum in such a city as Brooklyn.

We trust not only in Brooklyn, but throughout the country, this matter will receive the attention it merits. Why should we enforce laws against the indiscriminate vending of poisons, and let these scamps who sell dangerous burning fluids prosecute their trade?

There are plenty of safe and good oils in the market, and those who manufacture them are entitled to protection from the competition of the unscrupulous dealers. When it is clearly the interest of ninety-nine hundredths of the entire community to suppress this swindle, we marvel that it is so long tolerated.

FLOW OF FLUIDS WITHOUT FRICTION.

THE Boston *Advertiser* works itself up into raptures over an alleged improvement in the transmission of power by air columns in pipes, which, it claims, entirely does away with friction. This is the invention of Mr. Spear, and consists in placing annular obstructions or rings at intervals along the interior of a tube. The action of these rings is claimed to be the maintaining of a comparatively motionless lining of air in the tube, through which the central column is forced with no friction.

Now, when theory is controverted by a well-established fact, the fact must be accepted, and theory must go to the wall. If the experiments described by the paper alluded to establish the claim of no friction as a fact, we should accept its statements as correct, notwithstanding they conflict with hitherto accepted theory. But we see nothing to convince us that any test described logically leads to the inference, that a fluid column will pass through such a tube as Mr. Spear has constructed without loss of power.

The experiments lack that refinement which inspires confidence in the results of an investigation.

There is evident confusion in regard to the meaning of the word "power," as indicated by the following quotation:—

"The effect of the ring or diaphragm is to line the pipe with a hollow cylinder of air throughout, which cannot advance, being prevented by the ring and held against the pipe with a pressure of 40 pounds to the inch, and all the friction which occurs is, consequently, that of air against air. There are, now, at a considerable distance from the reservoir, an orifice of one inch, and a *pressure of 40 pounds to the inch, and, there being no more than these at the reservoir itself, no force has been lost in the transmission.* The reservoir has been virtually moved forward to this point. Repeating the operation at the same distance out from this point as from this to the reservoir, produces the same result. Each joint or section of the pipe charges the succeeding with the original force, and it would seem that there can be no limit to the application of the principle."

The italics are ours. Now, the only elements considered here are the pressure and the aperture. Velocity of flow does not enter into the equation. We know of no way in which the power of a moving mass can be computed without taking velocity into account. Pressure alone is not power.

We have no doubt that a pipe constructed on Mr. Spear's plan would transmit a column of air having the same diameter as that of the interior of the rings, with less friction than would be the case with a column of the same size transmitted through a pipe of the same size throughout; but the column must pass through the rings, and certainly this cannot be done without friction, unless science has been hitherto altogether at fault.

We like sanguine, enthusiastic people, but they are not usually the best judges of the value of an invention, and we much fear that our brother of the *Advertiser* belongs to this class. The only demonstration of the importance of Mr. Spear's invention will be through carefully conducted experiment; and although we doubt that he has made a very great discovery, no one would be more pleased to find this supposition a mistake than ourselves.

RAPID TRANSIT—RAPID CONSTRUCTION.

SOMETHING at last that looks like work in bringing about the long-wished-for rapid transit for New York is announced in the daily papers. Ground will be broken for the Vanderbilt Underground Railroad within the coming month, by a force of between 2,000 and 3,000 laborers, who will begin work in separate gangs, stationed at half-mile distances along the route. The down-town depot is to be erected in the City Hall Park, facing the new Post-office, and will be 50 by 150 feet in size, the right to use this site being given by the charter. The track level, waiting-rooms, and offices will be 20 feet below the surface, and will be surmounted by a handsome arched glass roof, rising to a hight of about 30 feet. It is intended that the design for this shall be artistic, and in harmony with the adjoining buildings.

The route finally adopted runs through Center Street to Mott, curving thence northeast through the Bowery to Fourth Avenue, and connecting with the main track of the Harlem Road at Fifty-sixth Street. For over 600 feet in the low ground near the Five Points the track will necessarily touch the street level, and will be simply walled in, the intersecting streets being bridged across. Depots will occur at half-mile distances, but for obvious reasons the company decline to publish at present the sites chosen. Superintendent Buckhout, of the Harlem road, under whose supervision the underground road will be built, is confident of finishing the work within two years. A similar pledge is made by the Gilbert Elevated Railway projectors, who will undertake to complete their road to Harlem in two years. They have not yet, however, succeeded in obtaining Gov. Hoffman's signature, although influential petitions have been presented in favor of their plan. Neighboring cities which have grown so rapidly of late through the neglect of New York, and which have neglected to provide such facilities as now appear to be forthcoming for our city, will from this time probably set limits to their aspirations.

PROLIFIC PEPPINS.

THE command to increase and multiply has, according to the *Burlington (Vt.) Free Press*, been obeyed by a pair of the name of Peppin, residing at Winooski, to an extent scarcely exceeded by the ancient Hebrews. Each of this prolific pair was of Canadian extraction. The father is dead, but the mother is still living, at the age of ninety-nine. She has had but one husband, Francois Peppin, who died twelve years ago. Mrs. Peppin has been the mother of twenty-three children, twelve of whom are still living. The sum total of the progeny of Francois Peppin and his wife Marie, including grandchildren and great-grandchildren, amounts to a tribe of two hundred and twenty. Vermont may challenge any other State to beat this.

THE NEWFOUNDLAND FISHING FLEET DISASTER.

THE extent of this disaster is probably greater than was at first feared. It is now ascertained that more than forty vessels are total wrecks, and this number will undoubtedly be increased by reports from the hundreds of vessels not yet heard from. These wrecked vessels carried on the average 100 men, and out of the aggregate of 4,000, only 175 had at last reports been heard from. This record of marine destruction in so small a compass, and in so short a time, has few precedents in the annals of shipwreck.

CINCINNATI NATIONAL INDUSTRIAL EXPOSITION.

OUR readers will find on the outside page of the present number the advertisement of the above Exposition, to which we call attention. The two former Expositions held by this association were in every way splendid successes, and there can be no doubt that inventors and manufacturers desirous to introduce their inventions and wares will find unequaled facilities in the Exposition of this year. It is proposed to make the display this year the largest ever held in America. Extensive transportation arrangements have been made, and every measure has been taken to secure the convenience of visitors and exhibitors. Application for space should be made at once. The Exposition opens Sept. 4, and closes Oct. 5. Goods will be received from Aug. 14 to Aug. 31.

PATENT LAW CASE.

Hod Elevators.

UNITED STATES CIRCUIT COURT—SOUTHERN DISTRICT OF NEW YORK—MAY, 1872.

Before Judge Blatchford.

Pelham vs. *Brown and Dart.*—This was a suit instituted by Thomas M. Pelham, of the City of New York, to restrain the defendants, George W. Brown and James Dart, and their agents, etc., from making, using, or selling an "improved hod elevator" which said Pelham invented, and for which letters-patent were issued to him on the 28th September, 1869. The proofs in the case showed that prior to Pelham's invention two modes were known for elevating bricks and mortar to be used in the construction of buildings. One was to carry the same in tubs by means of crabs to which the tubs were attached, and after they were elevated to the desired point the contents of the tubs were discharged. The effect of this discharge was to shake and seriously injure the walls. The other mode was to carry up the hods by means of elevators, the bowls of the hods being suspended above the platform, so that the shanks or handles would be in an upright position, the ends not touching the platform of the elevator. This made it necessary for the workmen who had to remove the hods to step upon the platform of the elevator, and thereby endanger their lives. Before Pelham's invention many accidents happened and many lives were lost by men stepping on the platform of the elevator. To remedy this evil, the complainant invented an improvement in said hod elevator, which consisted in this: that when the hod was being placed on the elevator the shank rested in a notch on the edge of the elevator, and the bowl of the hod left to rest on the transverse beam, so that

when they were being taken off the elevator it was only necessary for the men to catch hold of the handle of the hod (without stepping on the platform) and draw it towards them, and place the same on their shoulders to carry to the desired point. The case came on for argument before Judge Blatchford on the 28th of May last. After hearing Messrs. Stoughton, of counsel for the complainant, and George Stevenson, of counsel for respondents, he decided that the defendants had infringed on the complainant's patent, and granted a decree and injunction in accordance with the prayer of the complainant's bill.

The Prevention of Small-pox.

Dr. A. Armstrong, in the Canada *Lancet*, advises the following means in staying the ravages of small-pox:—Persons suffering from the disease should daily anoint their bodies and limbs throughout with carbolized oil; and also wash their bodies thoroughly with soft water, slightly carbolized; the anointing to be performed after the whole person has been washed, and gently dried with some soft fabric. This process should be commenced before patients are allowed to leave their sick-room, and continued until such time as all the diseased skin has been removed, and a new and healthy one formed. In this way the particles of diseased and desquamated skin are prevented from being set free from persons who have recently suffered, and contaminating healthy persons, by being inhaled or deposited on the exposed skin, or by getting into the water or food, and thus be a mode of contagion.

OPINIONS OF THE PRESS.

From among many flattering notices with which we have been favored by the press, we select at random a few.

From the Holmesburg Gazette, Philadelphia, Pa.

The American Artisan, one of the best scientific journals published in the country, comes to us considerably improved, under the new proprietorship of Messrs. Brown & Allen. To the mechanical world the Artisan has become an indispensable agent, by diffusing those principles and ideas that have done so much to advance science. It is a faithful laborer in this field of operations, and no mechanic who respects his calling should fail to become a subscriber.

From the Chicago Railway Review.

The publishers of this excellent magazine announce a change in its editorial management by the withdrawal of J. W. Coombs, Esq., on account of protracted ill health. He is succeeded by Mr. Leicester Allen (heretofore associate editor of the *Scientific American*), who assumes the editorial management of the Artisan. The issue of May 1 contains the following papers of especial interest to railway men:—The Preservation of Timber; Foote & Randall's Printing Telegraph, showing an app lance which any ordinarily intelligent person may in a few hours learn to use with rapidity and success, dispensing with the old and much more uncertain and expensive system of telegraphy, which requires the attention of adepts long experienced in their use; "Cooling and ventilating Railway-cars," treating, as the title denotes, upon the ventilation of cars in the summer months, and their warming in winter without danger from the so much and so deservedly dreaded stoves which add such horrors to accidents when they do occur. The suggestions are timely and *apropos*. The heating of railway carriages is another article cognate to the last named, and well worthy of the attention of our railway-car builders.

Hillsboro Messenger, N. H.

Mr. J. W. Coombs, who has long been connected with the American Artisan, published at New York, has retired from the firm on account of failing health. The Artisan will now be published by Brown & Allen. The Artisan is fast becoming a favorite.

Henry Republican, Ill.

The American Artisan has changed hands, Mr. J. W. Coombs, one of its senior members, retiring, giving place to Mr. L. Allen, late associate editor of the *Scientific American*, under the firm name of Brown & Allen. The Artisan is a scientific journal, in every way of value to every mechanic, engineer, or artisan.

Cortland County Republican, N. Y.

The American Artisan is now published by Messrs. Brown & Allen, at 189 Broadway, New York. Mr. L. Allen, for the past four years connected with the *Scientific American*, has bought the interest of Mr. Coombs in the Artisan, and will hereafter be its editorial manager. Several improvements attend this change. The Artisan is a journal of arts, mechanics, inventors' patents, etc. It is a valuable periodical.

Business Guide, Cincinnati, Ohio.

Mr. Leicester Allen, late associate editor of our able cotemporary the *Scientific American*, has purchased the interest of Mr. J. W. Coombs in the American Artisan. Mr. Allen will assume the editorial management of the Artisan. Mr. H. T. Brown, of the old firm of Brown, Coombs & Co., will have charge of the Patent Agency business, where his long experience, and extensive acquaintance with inventors, together with a thorough knowledge of American and Foreign Patent business, will largely assist general industry and scientific progress. The style of the new firm is Brown & Allen.

Railroad Record, Cincinnati, Ohio.

The Artisan is one of the most valued of our exchanges. We observe by a recent issue that a change has been made in its management. J. W. Coombs, Esq., on account of ill health, has been compelled to retire, and Mr. Leicester Allen, for the last four years associate editor of the *Scientific American*, has assumed the responsibilities of the editor-in-chief of the Artisan. Mr. Allen brings with him to the Artisan a rich experience, and talents peculiarly adapted to the labors he has assumed; we assure him he has our good wishes, with no fears for his ultimate success.

Jersey County (Ill.) Democrat.

American Artisan.—From the last issue of this useful and ably conducted weekly, we learn that quite an important change has taken place in its management. Mr. Coombs has been compelled, by declining health, to retire from the firm of Brown & Coombs, and his mantle has fallen upon Mr. L. Allen, formerly associate editor of the *Scientific American*, and a gentleman of great ability and peculiar qualifications for the place and duties he has assumed. The new firm of Brown & Allen will continue the extensive Patent Agency business of the old firm, and may be relied upon by all who may need the services of efficient Patent Attorneys. All mechanics should subscribe for the American Artisan. $2 per annum. Brown & Allen, 189 Broadway, New York.

NEW AMERICAN PATENTS.

Under this head we shall give a weekly summary of the more important American and English Patents.

Machine for planing the Facets of Polygonal Bars.—W. Fothergill Batho, Birmingham, England, asgr. to W. Sellers & Co., Philadelphia, Pa.—*May* 28.—A combination of a series of radial spindles with a series of flattened cutters, and mechanism for sustaining and traversing the material to be cut, which is operated upon in a direction perpendicular to the axes of the cutter-spindles, comprises the most prominent features of this machine. The series of flattened cutters are so arranged in relation to each other that while simultaneously rotating, and each intersecting the path of those adjacent to it, the cutting edges of the tools do not come into collision with each other.

Car Spring.—H. N. Eggleston, asgr. to himself and C. French, Seymour, Conn.—*May* 28.—This car spring is composed of one or more spiral metal springs, and one or more rubber springs, arranged to act separately, yet to mutually support each other.

Gas Apparatus for melting Snow and Ice on Sidewalks.—J. Folkman and F. Kölgen, Vienna, Austro-Hungarian Empire.—*May* 28.—This invention consists, first, in the use of gas to melt snow and ice on sidewalks, etc., and, secondly, in arrangements and construction of pipes, etc., to operate together for the purpose specified.

Pocket Scissors.—A. J. Young, Dover, N. H.—*May* 28.—These scissors are so constructed that when the blades are closed together, bows hinged to the blades partially overlap each other and inclose the blades.

Testing Burning Fluids.—P. Millspaugh, asgr. to Flora T. Millspaugh, Kent, Conn.—*May* 28.—This is a combination with an instrument for testing burning fluids of a transparent cylinder containing the fluid, into which a thermometer is submerged. In combination with this cylinder there is a hydrometric scale.

Safety Stop for Engines.—W. H. Darling, asgr. to himself and J. B. Sharp, New York City.—*May* 28.—This is a combination with the supply valve of an engine of a weight or spring, and a stop, the stop being connected by any suitable means with various parts of the building, so that the operatives may, in case of danger, at once stop the engine.

Safety Mask.—D. W. Flora, Newaygo, Mich.—*May* 28: ante-dated *May* 25, 1872.—This mask is constructed of successive layers of wire gauze and films of cotton, the cotton being saturated with disinfectant substances.

Manufacture of Acids and Paints from the Materials used to purify Gas.—J. Hughes, Stapleton, N. Y., asgr. to himself and J. C. Thompson, New Brighton, N. Y.—*May* 28.—Saturated or spent gas-purifying materials are by this invention converted either into acids or a base for paints, the metallic oxyds being utilized for the latter purpose.

Steam-boiler.—O. Wehoskey, Providence, asgr. of one-half his right to B. F. Arnold, Westerly, R. I.—*May* 28.—This boiler is composed of horizontal sections, made in the shape of wheels with hollow spokes radiating from hollow hubs, and double rims, the spaces between the rims forming return flues from the top of the boiler to a chamber at the bottom.

Removable Handle for Sadirons.—C. Graham, Kingston, Pa.—*June* 4.—This invention consists in the combination with a single standard cast or otherwise secured to the body of the iron, of an eye-bolt applied to said standard and a handle which surrounds the shank of the said bolt and contains a nut screwing on to a screw-thread on the said shank, whereby the handle is screwed to the standard so as to be adjusted at various hights relatively to the body of the iron, and in such manner that its attachment and detachment is rendered very easy. It also consists in novel means of securing, in combination with said eye-bolt, collar, and handle, a shield or guard for protecting the handle from the heat radiated from the iron.

Improvement in Pavements.—J. Merlette, Bound Brook, N. J.—*June* 4.—This invention relates to iron pavements, and consists in a novel construction and arrangement of cast-iron blocks, with ties, which may be of wood, arranged to pass through a series of adjacent blocks at opposite ends as it were of each succeeding one, so as to effectually tie and bind the several blocks of the pavement together in directions at right angles to the ties. The invention also consists in facing the ties, when made of wood above and below, or either, with metal strips to prevent the ties being bruised or injured by the vibration of the blocks consequent upon heavy loads passing over the pavement.

Drain-screw Attachments.—J. A. Lowe, New York City.—*June* 4.—This invention relates to water or stench traps, both when cast with and without a seam, in lead or composition, and consists in a novel insertion of or method of imbedding a hard metal nut or screw-box within the lower curve of the trap or projection therefrom, for reception of the tap or drain screw, and whereby is combined a stiff or solid and durable hard metal bearing for the thread of the screw, with a soft metal facing for the head or heel of the screw to make close or water-tight the drain-hole or opening in the trap.

Drawing-board.—C. G. Collins, New York City.—*June* 4.—The object of this invention is to prevent the splitting of the longitudinal portion or sections of a drawing-board, in shrinking transversely to the transverse end pieces or battens which are used to secure the longitudinal portion or sections against warping. To this end, it consists in the combination with the said longitudinal portion or sections, and with the end pieces or battens fitted to the former by tongues and grooves, of slots or cavities in the said end pieces, bridge-plates arranged over the said slots, and screws passing through the latter, and through the said slots and screws into the ends of the said longitudinal portion or sections, whereby the shrinkage of the latter is provided for without their splitting.

Apparatus for raising Liquids.—J. McCloskey, New York City.—*June* 4.—This invention consists in a novel arrangement of the floats and valves in their respective chambers in an apparatus for elevating water, also applicable to raising other liquids, in which a pressure accumulator or generator, operating by the compression of air derived from an intermittent influx and efflux of water under a head or pressure, is combined with one or more elevated receivers or transfer chambers, said floats controlling the valves for alternately opening and closing inlets and outlets with which the accumulator and receivers are provided.

Potato Harvester, Sorter, and Loader.—W. Peacock, New York City.—*June* 4.—This invention consists in a novel arrangement of a shovel, a system of screws and carriers, and a partitioned box and frame for supporting the same, whereby the potatoes are dug, separated from the earth taken up with them, and sorted. It also consists in a novel construction of the shovel, whereby it can be adjusted to dig different depths.

OFFICIAL LIST OF PATENTS

ISSUED FROM THE UNITED STATES PATENT OFFICE

For the Week ending June 4, 1872.

AND EACH BEARING THAT DATE.

[*Reported officially for the "American Artisan."*]

127,402.—Apparatus for burning Hydrocarbon Vapors.—F. C. Ambler, New York City.

127,403.—Safety Harness.—J. L. Arnold, Lowndesville, S. C. Ante-dated May 15, 1872.

127,404.—Child's Carriage.—G. L. Atwater, asgr. to the New Haven Folding-chair Co., New Haven, Conn.

127,405.—Sifting-shovel.—Mary J. Butler, Cooperstown, N. Y.

127,406.—Churn.—W. C. T. Davidson and W. H. Durrett, Hannibal, Mo.

127,407.—Dumping-cart.—S. Doubleday, Baltimore, Md. Ante-dated May 17, 1872.

127,408.—Tooth-powder for Dentifrices.—W. H. Farnham, Sparta, Wis. Ante-dated May 17, 1872.

127,409.—Carbureter.—F. A Fisher, Cranford, N. J.

127,410.—Liquid-measuring Device.—R. H. Fisher, Boston, and S. L. Bell, Wellfleet, Mass. Ante-dated May 20, 1872.

127,411.—Making Illuminating-gas.—J. L. Graves, Springfield, Mass.

127,412.—Process for coating Iron with Zinc.—J. D. Grey and J. Lippincott, Baltimore, Md. Ante-dated May 16, 1872.

127,413.—Middlings Separator.—A. R. Guilder, Minneapolis, Minn.

127,414.—Machine for burnishing Boot and Shoe Heels.—G. C. Hawkins, Boston, Mass. Ante-dated May 15, 1872.

127,415.—Process of treating Peat.—B. R. Hawley, Normal, Ill., and A. R. Morgan, New York City.

127,416.—Wringing-mop.—R. Holgate, Wyoming, and C. Hart, Farmington, Ill.

127,417.—Die for forging Squares.—H. K. Jones, asgr. to Hart Manufacturing Co., Kensington, Conn.

127,418.—Manufacture of Glucose.—W. H. Keyt, Madison, Ind.

127,419.—Manufacture of Bricks.—T. C. Kier, Pittsburg, Pa.

127,420.—Inhaling and Fumigating Apparatus.—E. C. Kirkwood, asgr. of two-thirds of his right to D. Carrigan and E. A. Adams, Washington, D. C.

127,421.—Burglar-alarm.—G. W. Love, Owasso, Mich.

127,422.—Bilge-water Gauge for Vessels.—C. McCloskey, East Cambridge, Mass.

127,423.—Machine for sewing Boots and Shoes.—D. Mills, Brooklyn, asgr. to C. Goodyear, Jun., New Rochelle, N. Y.

127,424.—Canal-boat.—N. H. Murray, Louisville, Ky.

127,425.—Hinge for Shutters.—H. L. Norton, Middletown, Conn.

127,426.—Manufacture of Coloring Matter from Anthracene.—W. H. Perkin, Sudbury, England.

127,427.—Provision-Press.—F. Potter, Rushville, Ill.

127,428.—Grate-bar for Furnaces.—A. Rawson, Des Moines, Iowa.

127,429.—Lubricating Compound.—C. Reck, of near Floraville, Ill.

127,430.—Sewing-machine.—J. Reece, asgr. to himself and O. Morrill, Stanstead, Canada.

127,431.—Box for Candies, etc.—G. Ruger, La Fayette City, Ind.

127,432.—Tucker for Sewing-machines.—W. W. Russell, Malden, Mass.

127,433.—Wash-stand Water-supply and Waste Arrangement.—H. J. Ruthrauff, Warrensburg, Mo.

127,434.—Sewing-machine Driving-wheel.—A. W. Sawyer Cleveland, Ohio.

127,435.—Tabulating Device.—C. W. Seaton, Washington, D. C.

127,436.—Machine for twisting Metal.—T. Smith, Green Island, N. Y.

127,437.—Propulsion of Canal-boats.—T. Smith, Green Island, N. Y.

127,438.—Manufacture of Cement Pipe.—A. P. Stephens, Brooklyn, N. Y.

127,439.—Photographer's Posing-chair.—I. O. Swett, Brighton, Mass.

127,440.—Slate-pencil Machine.—D. J. Tittle, asgr. to Abbie M. Tittle, Albany, N. Y.

127,441.—Elastic Buggy-gear.—I. N. Topliff, Elyria, Ohio. Ante-dated May 22, 1872.

127,442.—Trestle.—W. Tussey, Philadelphia, Pa.

127,443.—Cattle-car.—A. Welch, Southall, England.

127,444.—Washing Machine.—C. S. Williams, New Rochelle, N. Y. Ante-dated May 17, 1872.

127,445.—Jam-nut.—J. M. Winslow, Rochester, N. Y.

127,446.—Treating Petroleum and other Hydrocarbon Oils.—J. Young, Kelly, North Britain.

127,447.—Purifying Saccharine Juices.—T. E. O. Allaire, Paris, France.

127,448.—Sash-holder.—H. W. Baker, Burlington, W. Va.

127,449.—Atmospheric Water-elevator.—F. Baldwin, asgr. to A. Graham, Janesville, Wis.

127,450.—Car-coupling.—H. W. Barnum, Omaha, Nebraska.

127,451.—Direct-acting Steam-engine.—H. A. Benson and W. Avery, Warren, Mass.

127,452.—Stem-winding Watch.—J. A. Borel, P. Courvoisier, and J. Courvoisier, Neufchatel, Switzerland, asgrs. to F. Quinche and C. L. Krugler, New York City.

127,453.—Cultivator.—H. W. Bowen, Providence, R. I. Ante-dated May 29, 1872.

127,454.—Shield for Corns, etc.—B. Brandreth, Sing Sing, N. Y.

127,455.—Stove-board.—J. S. Brooks, Rochester, N. Y.

127,456.—Spooling Silk.—H. L. Brown, Middletown, Conn.

127,457.—Saw-swage.—I. S. Brown, C. N. Brown, and J. R. Wheeler, asgrs. to Providence Saw Company, Providence, R. I.

127,458.—Cover for Magazine Stoves.—J. A. Buckwalter, asgr. to Francis, Buckwalter & Co., Royer's Ford, Pa.

127,459.—Eyeglass.—J. Cadman, Chatham Village, N. Y.

127,460.—Wind-wheel.—H. J. Campbell, Virginia, Ill.

127,461.—Hog-trap.—M. Caywood, Farmington, Ill.

127,462.—Saw-filing Machine.—T. M. Chapman, Oldtown, Maine.

127,463.—Apparatus for the Manufacture of Warp and Paper-pulp Fabrics.—L. M. Crane, Ballston Spa, N. Y.

127,464.—Sucker-rod Joint.—A. Crosby, Westfield, N. Y.

127,465.—Saw-mill Head-block.—P. M. Cummings, Muscatine, Iowa.

127,466.—Water-circulating Pipe for Steam-boilers.—W. Dillon, Wheeling, W. Va.

127,467.—Steam-boiler Brick or Tile.—W. Dillon, Wheeling, asgr. of one-half of his right to B. J. Smith, New Cumberland, West Va.

127,468.—Gauge-cock.—W. H. Downing, asgr. to P. Morris, Shamburg, Pa.

127,469.—Cultivator.—N. Earlywine, Centerville, Iowa, asgr. to himself and C. A. Davis, St. Louis, Mo.

127,470.—Preparation of Ammonia, Sulphur, and other Products from Gas-lime.—R. J. Everett, asgr. to W. H. Adams, Bridgeport, Conn.

127,471.—Water-wheel.—W. Forward, Battle Creek, Cal.

127,472.—Paper-clip.—E. A. Franklin, Brenham, Tex.

127,473.—Extension Fire Hydrant.—J. Fricker, Jun., Cincinnati, Ohio.

127,474.—Wheel for Vehicles.—H. R. Fry, Wabash, Ind.

127,475.—Plow.—H. Gillette, Milleville, N. Y.

127,476.—Hot-air Furnace.—B. Gommenginger, Rochester, N. Y.

127,477.—Horse-stall Floor.—G. W. Gordon, Charlestown, Mass.

127,478.—Machine for crozing and chamfering Barrels.—J. Greenwood, Rochester, N. Y.

127,479.—Bee-hive.—S. V. Greer, Glasgow, Ky.

127,480.—Pump Piston.—A. Griffin, Shamburg, Pa.

127,481.—Clothes-drier.—O. H. R. Harding and J. Willis, Quincy, Mich.

127,482.—Process and Apparatus for treating Wood.—I. Hayford, Boston, Mass.

127,483.—Electric Clock.—V. Himmer, asgr. to himself and G. Autenrieth, New York City.

127,484.—Folding Stool and Chair.—L. Hirsh, Philadelphia, Pa. Ante-dated May 17, 1872.

127,485.—Washing Machine.—A. Hochweber, Troy, Ind.

127,486.—Cotton-can.—R. R. Hulme, Providence, R. I.

127,487.—Railroad Conductor's Check-box.—E. Keith, asgr. to J. W. Gordon, Buffalo, N. Y.

127,488.—Shaft-hanging.—W. J. Kennedy, Victory Mills, N. Y.

127,489.—Fulling Machine.—C. P. Ladd, Bloomfield, N. J., asgr. of one-half of his right to J. T. Sanford, New York City.

127,490.—Water-wheel.—J. P. Lamoree, Mexico, N. Y. Ante-dated May 24, 1872.

127,491.—Spring-link for Wire Rigging, etc.—J. E. Liardet, Middlesex County, England.

127,492.—Grindstone Axle.—J. W. Ligon, Marion, Ky.

127,493.—Sash-holder.—A. W. Lozier, Yonkers, N. Y.

127,494.—Thrashing Machine.—J. A. Lutz, Bucyrus, Ohio.

127,495.—Gang-plow.—D. A. Manuel, Napa, Cal.

127,496.—Stench-trap.—J. Marquis, San Francisco, Cal.

127,497.—Construction of Buildings.—W. McGiniss, Canandaigua, N. Y.

127,498.—Bee-hive.—S. D. McLean, Sunny Slope, Tenn.

127,499.—Soldering-iron.—L. McMurray and R. J. Hollingsworth, Baltimore, Md.

127,500.—Magazine Fire-place Stove.—J. F. Merrill, Cincinnati, Ohio.

127,501.—Spoke-socket for Carriage-wheels.—S. Mitchell, asgr. of one-half of his right to C. Deal, Lima, N. Y.

127,502.—Rubber Pad and Block for Steps, Sidewalks, etc.—J. Moffet, New York City.

127,503.—Sled-brake.—J. Moon, Spring Valley, Minn.

127,504.—Shoe.—C. C. Morse, asgr. to Pancost, Sage & Morse, Rochester, Ind.

127,505.—Door-latch.—W. H. Mott, New York City.

127,506.—Funnel.—S. W. O'Laughlen, Baltimore, Md. Ante-dated May 20, 1872.

127,507.—Traction Engine.—O. A. Olmsted, Sebastopol, Cal.

127,508.—Cultivator.—W. C. Percy, Bayou Sara, La.

127,509.—Nut-lock.—R. G. Peterson and J. Coulter, Perryville, Ohio.

127,510.—Wood Pavement.—J. I. Peyton, asgr., by mesne-assignment, to himself, J. B. Peyton, and G. W. Linville, Washington, D. C.

127,511.—Steam-generator.—L. Phleger, Philadelphia, Pa.

127,512.—Stereotype-block.—W. A. Pinnell, New York City.

127,513.—Bee-hive.—C. H. Potter, Philadelphia, Pa.

127,514.—Grate for Furnaces, Stoves, etc.—P. W. Pratt, Abington, Mass. Ante-dated May 18, 1872.

127,515.—Carpet-stretcher.—D. Pray, Boston, Mass.

127,516.—Stove-pipe Damper.—C. Read, Beaver Dam, Wis.

127,517.—Machine for spreading Plasters.—W. N. Reed, Arlington, Va.

127,518.—Dental Drill.—J. J. Ross, Memphis, Tenn.

127,519.—Desk-lid Prop.—H. R. Russell, Woodbury, N. J., asgr. to himself and I. S. Russell, New Market, Md.

127,520.—Butter-worker.—G. Ruston, Freeport, Ill.

127,521.—Clothes-wringer.—H. E. Smith, asgr. to Mary Jane Smith, New York City. Ante-dated May 20, 1872.

127,522.—Support for the Tongues of Vehicles.—H. Sprague, Marcellus, N. Y.

127,523.—Elastic Check for Car-axle Boxes.—J. Stephenson, New York City.

127,524.—Axle-box for Street-cars.—J. Stephenson, New York City.

127,525.—Street-car Brake.—J. Stephenson, New York City.

127,526.—Street-car.—J. Stephenson, New York City.

127,527.—Clothes-drier.—A. J. Stowell, Dunlap, Iowa.

127,528.—Apparatus for draining and cooling Sugar.—B. Tanner, Cheneyville, La.

127,529.—Machine for polishing the Eyes of Needles.—R. Thompson, Waterbury, Conn.

127,530.—Machine for holding Glass-blowers' Tools.—B. F. Turner, Bridgeton, N. J.

127,531.—Car-starter.—W. M. Watson, Tonica, Ill.

127,532.—Sewing-machine.—T. A. Weber, asgr. to L. W. Lathrop, New York City.

127,533.—Sewerage.—W. S. West, Washington, D. C. Ante-dated May 21, 1872.

127,534.—Corn-coverer.—D. Weygandt, asgr. to S. Stacher, Jeromesville, Ohio.

127,535.—Top for Heating-stoves.—H. Whittingham, New York City.

127,536.—Fence.—B. Williams, Williamsburg, Ohio.

127,537.—Horse-power.—D. Woodbury, Rochester, N. Y.

127,538.—Sulky-plow.—J. Worrell and J. H. Rynerson, Clayton, Ind.

127,539.—Stop-motion for Knitting Machines.—T. F. Wynn, Atlanta, Ga.

127,540.—Earth-closet.—J. L. Young, New York City.

127,541.—Plane-stock.—S. M. Adams, Fitchburg, Mass.

127,542.—Bridge for Ferry-boats.—W. J. Alsop, Camden, N. J. Ante-dated May 21, 1872.

127,543.—Shutter-fastener.—W. Altick, asgr. to himself and C. R. Walker, Dayton, Ohio.

127,544.—Construction of Car-wheels.—W. M. Arnold, New York City.

127,545.—Washing Machine.—G. H. Ashworth and A. F. Van Voorhis, Arcola, Ill.

127,546.—Wardrobe-bedstead.—R. M. Austin, Philadelphia, Pa.

127,547.—Stop-cock.—G. G. Bailey, Pittsburg, Pa.

127,548.—Mode of operating Rock-drills.—A. Blatchley, San Francisco, Cal.

127,549.—Plow.—E. A. Blodgett, Columbus, Neb.

127,550.—Leather Hat.—A. Bogardus, Newburg, N. Y.

127,551.—Process of coloring Bricks.—W. Boles, Troy, N. Y.

127,552.—Composition Post for Fences, Telegraph-poles, etc.—J. L. Boone, San Francisco, Cal.

127,553.—Composition Railroad Tie.—J. L. Boone, San Francisco, Cal.

127,554.—Building Block.—J. L. Boone, San Francisco, Cal.

127,555.—Steam Packing.—A. O. Bourn, Providence, R. I.

127,556.—Water-cooler.—J. W. Brady, Catonsville, Md.

127,557.—Press.—T. G. Brooke, Newark, Ohio.

127,558.—Fence.—F. G. Brown, Chapel Hill, Tex.

127,559.—Ventilator for Railroad-cars.—J. H. Bruce, asgr. of one-half of his right to A. B. Bartlett and J. K. Hale, Wyandotte, Kan.

127,560.—Chair-seat Frame.—H. Buchter, Louisville, Ky.

127,561.—Ore-crusher.—J. Burns, New York City.

127,562.—Mold for Concrete Blocks.—J. P. Campbell, asgr. of one-half of his right to J. M. Perrine, Dayton, Ohio.

127,563.—Manger.—E. Carlin, United States Army.

127,564.—Truss Bridge.—M. S. Cartter and H. B. Cartter, St. Louis, Mo.

127,565.—Curtain-fixture.—D. G. Chase, Boston, Mass.

127,566.—Carding Machine.—F. T. Chase and J. H. Platt, Dudley, Mass.

127,567.—Wash Boiler.—S. L. Cheney, Kansas City, Mo.

127,568.—Product from Petroleum.—R. A. Chesebrough, New York City.

127,569.—Adjustable Supporting Spring.—J. Christy, asgr. of one-half of his right to J. M. Gaughen, Philadelphia, Pa.

127,570.—Railway Rail-splice.—D. J. Clark, Evansville, Ind.

127,571.—Caster for Sewing-machines.—D. J. Clark, Evansville, Ind.

127,572.—Governor for Steam and other Engines.—W. Clark, Plumstead, England.

127,573.—Drawing-board.—C. G. Collins, New York City.

127,574.—Machinery for breaking and crushing Stones, etc.—J. Comly, Philadelphia, Pa.

127,575.—Liquid Meter.—I. Cook, St. Louis, Mo. Ante-dated May 20, 1872.

127,576.—Chain Pump.—W. Cooper, Ypsilanti, Mich.

127,577.—Clothes-wringer.—W. Cooper, Ypsilanti, Mich.

127,578.—Sewing-machine Chair.—S. W. Cozzens, Milwaukee, Wis.

127,579.—Bag string Inserter.—W. J. Cussen, Richmond, Va.

127,580.—Apparatus for coating Sheet-iron with Tin.—W. O. Davies, Pittsburg, Pa.

127,581.—Railway Tie.—D. B. Day, Ridgway, Pa.

127,582.—Machine for polishing the Eyes of Needles.—W. H. Dayton and J. Alldis, asgrs. to the Excelsior Needle Company, Walcottville, Conn.

127,583.—Sheet-metal Pipe-elbow.—F. Dieckmann, Cincinnati, Ohio.

127,584.—Sash-holder.—C. H. Eccleston and Le R. Coville, Oxford, N. Y.

127,585.—Saw for sawing Stone.—J. E. Emerson, Trenton, N. J.

127,586.—Scouring and Hide-working Machine.—S. W. Fairfield and C. E. Getchell, Salem, Mass.

127,587.—Hydrant.—G. W. Fisher, asgr. to G. B. Allen & Co., St. Louis, Mo.

127,588.—Railway Rail-chair.—M. G. Freeman, Bloomington, Ill.

127,589.—Stone-dressing Machine.—G. A. Fullerton, Boston, Mass.

127,590.—Clutch for supporting Water-bowls under Gas-burners.—S. Gardner, New York City.

127,591.—Military Band Instrument.—R. H. Gates, Lancaster, Ohio.

127,592.—Steam Water-elevator.—S. F. Gates, Cambridge, asgr. to C. Houghton, Boston, Mass.

127,593.—Refrigerator.—L. Giebrich, asgr. to Caroline Giebrich, Ottumwa, Iowa.

127,594.—Pump Piston.—C. B. Gill, Weedsport, N. Y.

127,595.—Dredging Machine.—L. J. Gonyo, asgr. to himself and C. L. Dayton, North Buffalo, N. Y.

127,596.—Removable Handle for Sad-irons.—C. Graham, Kingston, Pa.

127,597.—Cigar-box.—P. Greenwald, asgr. to himself and D. Donahue, Syracuse, N. Y.

127,598.—Manufacture of Bird-cages.—G. Günther, New York City.

127,599.—Weather-strip.—J. Haessel, Peoria, Ill.

127,600.—Cheese-bandager.—T. Hamer, Boylston, and G. W. Robinson, Sandy Creek, N. Y.

127,601.—Car-coupling.—E. W. Harvey, Springfield, Mass.

127,602.—Engine-governor.—J. F. Haskins, Fitchburg, Mass.

127,603.—Holder for Sectional Lamp-chimneys.—C. T. Haughey, Wabash, Ind.

127,604.—Sewing-machine Table.—E. W. Hoyt, Perry, N. Y.

127,605.—Neck-yoke.—J. Ives, asgr. to Ives, Woodruff & Co., Mount Carmel, Conn.

127,606.—Earth-closet.—A. A. Jaqua, New York City.

127,607.—Device for attaching Wheels to Axles.—D. A. Johnson, Boston, asgr. to himself and J. O. Frost, Chelsea, Mass.

127,608.—Milk-cooler.—J. Jones, C. D. Faulkner, F. L. Jones, and H. K. Faulkner, Utica, N. Y.

127,609.—Mosquito-screen for Windows.—G. A. Keene, Newburyport, Mass.

127,610.—Corn-sheller.—N. S. Ketchum, Marshalltown, Iowa.

127,611.—Sheaf-dropper for Harvesters.—N. S. Ketchum, Marshalltown, Iowa.

127,612.—BUTTER-PAIL.—S. D. King, Middletown, N. Y.

127,613.—PLOW.—M. W. Lane, assgr. of two-thirds of his right to W. Dill and W. Dill, Jun., Hillsborough, Ohio.

127,614.—URINAL PAN AND PIPE.—M. L. Lawrence, Pittsburg, Pa.

127,615.—SUSPENDER-END.—G. H. Leonard, East Hampton, Mass.

127,616.—STOP AND WASTE-VALVE APPARATUS.—J. H. Lewis, Binghamton, N. Y.

127,617.—FLOUR BOLT.—S. Lewis, Tiffin, Ohio.

127,618.—MACHINE FOR FEATHER-EDGING SOLES.—A. S. Libby, Lawrence, Mass.

127,619.—TOY-SPINNING TOP.—A. Linn, Philadelphia, Pa.

127,620.—DRAIN-SCREW ATTACHMENT FOR STENCH-TRAPS.—J. A. Lowe, New York City.

127,621.—LAMP.—D. Lubin, New York City.

127,622.—RAILROAD TANK-VALVE.—M. N. Lynn, assgr. to himself, E. M. Hubbert, and E. H. Mann, New Albany, Ind.

127,623.—CORN-STALK CUTTER.—H. Martin, Round Grove, Ill.

127,624.—APPARATUS FOR ELEVATING WATER, ETC.—J. McCloskey, New York City.

127,625.—PISTON-PACKING.—J. R. McCormick, Cincinnati, Ohio. Ante-dated May 17, 1872.

127,626.—GRAIN-SEPARATOR.—J. W. McKinstry, Columbus, Wis.

127,627.—PRESERVING MEATS, ETC.—J. F. Meiners, New York City.

127,628.—PAVEMENT.—J. Merlette, Sen., Bound Brook, N. J. Ante-dated May 20, 1872.

127,629.—WASHBOARD.—J. K. Miller and F. D. Bashore, Shamokin, Pa.

127,630.—MACHINE FOR CUTTING OUT BOOTS.—B. Millett, Woburn, Mass.

127,631.—MODE OF ATTACHING CLIPS TO HARNESS.—R. L. B. Milliken, South Bend, Ind.

127,632.—Canceled.

127,633.—LEAD-PENCIL.—T. H. Müller, Yonkers, N. Y.

127,634.—REIN-HOLDER.—C. B. Neff, Dallastown, Pa.

127,635.—MANUFACTURE OF STEEL.—C. M. Nes, York, Pa.

127,636.—HARVESTER-DROPPER.—H. Nisen, Brighton, Wis.

127,637.—COUPLING FOR DIVIDED AXLES.—C. A. Nutting, Macon, Ga.

127,638.—WHEEL FOR VEHICLES.—N. G. Olds, Fort Wayne, Ind.

127,639.—BEER-COOLER.—J. M. Otto, Brooklyn (E. D.), N. Y.

127,640.—POTATO-DIGGER.—W. Peacock, New York City.

127,641.—DETECTIVE-CLOCK FOR STEAM-BOILERS.—H. Pieper, New York City.

127,642.—SLIDE-VALVE FOR STEAM-ENGINES.—O. M. Pike, Hartford, Conn.

127,643.—MACHINE FOR MANUFACTURING STAVES.—D. S. Pratt, Orwell, N. Y.

127,644.—CAR-COUPLING.—G. W. Putnam, Morean, N. Y.

127,645.—CHAFE-IRON FOR WHEELED VEHICLES.—E. P. Roche, Bath, Maine.

127,646.—NEEDLE-SETTER AND TWEEZER FOR SEWING-MACHINES.—J. C. Schlarbaum, San José, Cal.

127,647.—APPARATUS FOR COOLING BREWERIES, CELLARS, BEER-VAULTS, ETC.—L. Schulze, Philadelphia, Pa.

127,648.—CORN-PLANTER.—W. G. Selby and J. Bowman, Princeville, Ill. Ante-dated May 25, 1872.

127,649.—CIGAR-HOLDER AND PERFORATOR.—R. J. Sheehy, Boston, Mass.

127,650.—PLOW.—G. Shelton, Normal, Ill.

127,651.—PUMP AND FOUNTAIN.—J. J. Sink, Philadelphia, Pa.

127,652.—LEGGINGS.—A. P. Smith, Rock Falls, Ill.

127,653.—BASE-BURNING STOVE.—E. Smith, Albany, N. Y.

127,654.—COFFEE-ROASTER OPERATED BY STEAM.—I. C. Smith, New York City.

127,655.—SAND-PUMP.—J. Smith, assgr. to himself and Winsor Brothers & Co., Franklin, Pa.

127,656.—COMPOUND FOR DENTAL PURPOSES.—V. Smith, Schenectady, N. Y.

127,657.—HORSE-SHOE.—A. Soles, assgr. of one-third his right to J. I. Brookman, Fonda, N. Y.

127,658.—CULTIVATOR.—G. Stiber, Cogan Station, Pa.

127,659.—HORSE HAY-RAKE.—J. C. Stoddard, Lockport, N. Y.

127,660.—REFLECTING LAMP-BURNER.—C. H. Tessy, Utica, N. Y. Ante-dated May 25, 1872.

127,661.—CAR WHEEL AND AXLE.—J. S. Upton, Battle Creek, Mich.

127,662.—SEWING-MACHINE FOR BOOTS AND SHOES.—H. S. Vrooman, Boston, Mass.

127,663.—ADHESIVE STAMP AND LABEL.—F. Walker, New Orleans, La.

127,664.—TAP FOR LIQUID PACKAGES.—A. Waith, Stapleton, N. Y.

127,665.—GUARD-RAIL.—W. Wharton, Jr., Philadelphia, Pa.

127,666.—HAY AND COTTON PRESS.—W. H. Whetstone, Lowndesborough, Ala.

127,667.—ROTARY ENGINE.—G. R. Winkler, Williamsport, Pa.

127,668.—WASHING MACHINE.—N. Young, Sunapee, N. H.

127,669.—WOOD PAVEMENT.—G. F. Ziegler, Jersey City, N. J. Ante-dated May 21, 1872.

127,670.—DRYING AND DEODORIZING ANIMAL MATTERS, OILS, ETC.—M. J. Stein, New York City.

RE-ISSUES.

4,927.—MACHINE FOR SLICING CANDY, ETC.—J. P. Anderson, Philadelphia, Pa. Patent No. 117,589, dated August 1, 1871.

4,928.—WHEEL-PLOW.—W. G. Crossley, assgr. to Black, Irvine & Co., Apple River, Ill. Patent No. 72,981, dated Jan. 7, 1868.

4,929.—APPARATUS FOR EXHAUSTING GAS FROM RETORTS.—J. Kidd, New York City. Patent No. 122,894, dated Jan. 23, 1872.

4,930.—CIRCULAR LOOM.—J. V. D. Reed, New York City. Patent No. 124,288, dated March 5, 1872.

4,931.—GOVERNOR.—C. P. Bowen, Silver City, Idaho Ter. Patent No. 120,866, dated October 31, 1871.

4,932.—DOOR-BELL.—M. L. Delavan and J. Dyson, New Britain, Conn.; said Delavan assgr., by mesne-assignments, to P. & F. Corbin. Patent No. 67,030, dated July 23, 1867.

4,933.—MANUFACTURE OF BOOTS AND SHOES.—L. H. Farnsworth, assignee of Phebe S. Alexander, administratrix of the estate of E. Alexander, deceased, Hudson, Mass. Patent No. 9370 dated August 4, 1863.

4,934.—SOLDERING-TOOL.—L. McMurray, Baltimore, Md. Patent No. 123,277, dated Jan. 30, 1872.

4,935.—COOKING-STOVE.—J. H. Shear, Albany, N. Y. Patent No. 94,658, dated Sept. 7, 1869.

4,936.—STEAM-JOINT FOR CANS, ETC.—E. A. Thomas, Philadelphia, Pa. Patent No. 83,107, dated Oct. 13, 1868.

4,937.—MACHINE FOR APPLYING FLOCK TO FELT-RUBBER GOODS.—I. F. Williams, Bristol, R. I. Patent No. 33,808, dated Nov. 26, 1861.

DESIGNS.

5,883.—CARPET-PATTERN.—M. Blatchford, Halifax, England, assgr. to J. Wild & Co., New York City.

5,884 to 5,890.—CARPET-PATTERN.—A. Cowell, Kidderminster, England.

5,891.—CARPET-PATTERN.—J. Humphries, Kidderminster, England.

5,892.—CLOCK-CASE.—N. Müller, New York City.

5,893 to 5,896.—CARPET-PATTERN.—D. Paton, Halifax, England, assgr. to J. Wild & Co., New York City.

5,897.—CARPET-PATTERN.—F. J. Peirce, assgr. to Roxbury Carpet Co., Boston, Mass.

5,898 and 5,899.—CARPET-PATTERN.—E. Poole, Halifax, England, assgr. to J. Wild & Co., New York City.

5,900.—GLASSWARE.—J. S. Atterbury and T. B. Atterbury, Birmingham, Pa.

5,901.—HEATING-STOVE.—C. H. Castle, assgr. to Comstock, Castle & Co., Quincy, England.

5,902 to 5,904.—CARPET-PATTERN.—J. Humphries, Kidderminster, England.

5,905.—CARPET-PATTERN.—A. McCallum, Halifax, England, assgr. to J. Wild & Co., New York City.

5,906 and 5,907.—FLOOR OIL-CLOTH PATTERN.—C. T. Meyer and V. E. Myer, Lyons Farms, N. J., assgrs. to E. C. Samson, New York City.

5,908 and 5,909.—CARPET-PATTERN.—E. Poole, Halifax, England, assgr. to J. Wild & Co., New York City.

5,910.—CARPET-PATTERN.—E. J. Ney, New York City, assgr. to Hartford Carpet Co., Hartford, Conn.

TRADE-MARKS.

843.—SCYTHE.—Beardsley Scythe Co., West Winsted, Conn.

844.—OVERSHOE.—E. F. Bickford, Malden, Mass.

845 and 846.—BITTERS.—H. S. Flint & Co., Providence, R. I.

847.—LEAD.—Forest River Lead Co., Salem, Mass.

848.—TAMARIND-BEER.—W. H. Goss, Boston, Mass.

849 and 850.—EDGE-TOOLS AND AGRICULTURAL IMPLEMENTS.—The Collins Co., Collinsville, Conn.

851.—STATIONERY AND MEMORANDUM BOOKS.—The Mercantile Loan and Warehouse Co., New York City.

EXTENSIONS.

20,314.—VALVE-COCK.—S. Adams. May 25, 1858; re-issued to himself and J. H. Davis, Feb. 20, 1872, No. 4,762.

20,337.—LEVELING DEVICE ATTACHED TO HAND-SAWS.—H. Disston and T. L. Morss (Julia A. Morss, administratrix of said Morss, deceased). May 25, 1858.

20,353.—PRODUCTION OF ELECTROTYPE-PLATES.—S. P. Knight. May 25, 1858.

20,356.—PROTRACTOR.—J. Lyman. May 25, 1858.

20,364.—CLOTHES-PIN.—D. Pierce. May 25, 1858.

20,385.—POWER AND HAND DRILLS.—H. Woodman. May 25, 1858.

EXTENSION REFUSED.

20,411.—RAKING ATTACHMENT TO HARVESTERS.—D. O. De Wolf, New York City. June 1, 1858.

DISCLAIMERS.

9,653.—LOOMS AND FABRICS PRODUCED THEREBY.—W. Smith, New York City. Dated April 5, 1853; extended seven years, March 28, 1867; re-issued June, 1867, No. 2,656; again re-issued in three divisions: A, No. 2,843, Jan. 14, 1868; C, No. 2,844, Jan. 14, 1868; and B, No. 3,014, June 30, 1868; disclaims as to re-issue patent No. 3,014.

APPLICATIONS FOR EXTENSIONS.

OPPONENTS of extensions must file *written* objections in the Patent Office at least 20 days before the day-of-hearing; and on that day, at noon, they must appear personally, or by proxy, at the Patent Office, and state the reasons of their opposition. All testimony—*pro* or *con*—must be taken and transmitted in accordance with the official rules, which will be furnished on application. The under-named patentees have recently petitioned for extensions (for seven years) of patents granted to them in the year 1858:—

ANN MORGAN, administratrix of MIRICK MORGAN, deceased, Silver Spring, Pa.—*Horse Rake.*—Patented Aug. 24, 1858: testimony will close on July 23, next; last day for filing arguments and examiner's report, Aug. 2; day-of-hearing, Aug. 7.

DAVID B. WRIGHT and LEONARD SAWYER, West Amesbury, Mass.—*Attaching the Props of Carriage Bows.*—Patented Aug. 31, 1858; testimony will close on July 30, next; last day for filing arguments and examiner's report, Aug. 9; day-of-hearing, Aug. 14.

ANTHONY G. DAVIS, Watertown, Conn.—*Sun-shade.*—Patented Aug. 31, 1858; testimony will close on July 30, next; last day for filing arguments and examiner's report, Aug. 9; day-of-hearing, Aug. 14.

ALLEN SHERWOOD, Auburn, N. Y.—*Raking and Binding Apparatus for Harvesters.*—Patented Sept. 14, 1858; testimony will close on Aug. 13, next; last day for filing arguments and examiner's report, Aug. 23; day-of-hearing, Aug. 28.

FRANCIS W. ROBINSON, Richmond, Ind.—*Straw-carrier for Thrashing Machines.*—Patented Aug. 31, 1858; testimony will close on July 30, next; last day for filing arguments and examiner's report, Aug. 9; day-of-hearing, Aug. 14.

HENRY S. AKINS, Berkshire, N. Y.—*Hillside Plows.*—Patented Aug. 31, 1858; testimony will close on July 30, next; last day for filing arguments and examiner's report, Aug. 9; day-of-hearing, Aug. 14.

CHESTER M. MANN, Detroit, Mich.—*Railroad-car Seat.*—Patented Aug. 31, 1858; testimony will close on July 30, next; last day for filing arguments and examiner's report, Aug. 9; day-of-hearing, Aug. 14.

ENGLISH PATENT JOURNAL.

LIST OF APPLICATIONS FOR PATENTS

ON WHICH

Provisional Protections

HAVE BEEN OBTAINED IN ENGLAND BY OR FOR AMERICAN INVENTORS.

[*This list is condensed weekly from the "Journal of the British Commissioners of Patents," expressly for the* "AMERICAN ARTISAN."]

1,257.—PROCESSES OF TREATING PHOSPHATIC ROCK, ETC.—G. Thompson Lewis, Philadelphia, Pa., and N. A. Pratt, Charleston, S. C.—April 26, 1872.

1,275.—MANUFACTURE OF CUT-PILE, ETC., CARPETS.—G. Crompton, Worcester, Mass.—April 27, 1872.

1,303.—LOCK-NUTS, ETC.—G. Mallory, Mystic Bridge, Conn.—May 1, 1872.

1,304.—ROOFING.—D. G. Conger, Chicago, Ill.—May 1, 1872.

1,319.—PRINTING PRESS.—A. Gally, Rochester, N. Y.—May 1, 1872.

1,345.—CARDING ENGINE.—J. F. Foss, Lowell, Mass., and G. E. Taft, Northbridge, Mass.—May 3, 1872.

1,350.—CENTRIFUGAL MACHINE.—J. Cottle, Boston, Mass.—May 3, 1872.

1,351.—ROTARY ENGINE.—G. B. Massey, New York City.—May 3, 1872.

1,352.—COMPOSITION FOR DRAIN PIPES, ETC.—J. Anderson, New York City.—May 3, 1872.

1,361.—MANUFACTURE OF KNITTED FABRICS.—H. Ramsdell and J. E. Crane, Lowell, Mass.—May 4, 1872.

1,378.—ELECTRIC TORCH.—W. W. Batchelder, New York City.—May 6, 1872.

1,382.—TREATMENT OF CORN, ETC.—G. M. Wells, Boston, Mass.—May 6, 1872.

1,403.—EYELETING MACHINE.—J. E. Wiggin, County of Middlesex, Mass.—May 8, 1872.

1,408.—APPARATUS FOR PRODUCING COMPRESSION UPON METALLIC ARTICLES.—J. B. West, Genesee, N. Y.—May 8, 1872.

1,418.—MULER FOR SPINNING.—J. Sutherland, East Hampton, Mass.—May 9, 1872.

1,422.—APPARATUS FOR PUDDLING AND MELTING IRON.—H. A. V. Post, United States.—May 10, 1872.

1,459.—PIANO-FORTE.—C. F. T. Steinway, New York City.—May 14, 1872.

761.—MACHINE FOR WORKING HIDES.—E. Fitzhenry, Somerville, Mass.—March 13, 1872.

1,417.—TRACTION ENGINE, ETC.—G. W. Fitts, Philadelphia, Pa.—May 9, 1872.

1,425.—CLAMP FOR JOINING ROPES, ETC.—T. H. Alexander, Washington, D. C.—May 10, 1872.

1,452.—PNEUMATIC SIGNAL APPARATUS.—A. G. Myers, New York City.—May 13, 1872.

1,453.—PRINTING TELEGRAPH.—T. A. Edison, Newark, N. J.—May 13, 1872.

1,454.—PROCESS FOR STEELIFYING IRON.—T. Sheehan, Chautauqua County, N. Y.—May 13, 1872.

1,470.—MANUFACTURE OF SHOES.—W. J. Bernard Mills, Philadelphia, Pa., and De W. C. Taylor, Elizabeth, N. J.—May 14, 1872.

1,496.—ADJUSTMENT FOR TIME-KEEPERS.—H. B. James, Trenton, N. J.—May 16, 1872.

1,499.—COMBINED SEAT AND DESK.—W. H. Curtis, New York City.—May 16, 1872.

1,500.—APPARATUS FOR PREVENTING ESCAPE OF FOUL AIR IN DRAIN PIPES.—J. Daniels, Washington, D. C.—May 16, 1872.

1,537.—ELECTRIC TELEGRAPH SIGNAL APPARATUS.—E. A. Calahan, Brooklyn, N. Y.—May 20, 1872.

QUERIES.

We will hereafter publish in this column such queries as are from their nature likely to elicit practical answers of general utility to our readers. Questions not relating to business, and of merely personal interest to the querist, will not be published here, but we will willingly give them such attention in private correspondence as we can, without neglect of more important duties. We earnestly solicit from our readers either queries or answers of such a character as we have specified, and we hope by this means to make our paper a valuable medium of intercommunication between them.

1. SILVERING GLASS.—How can I silver the interior of glass bulbs? J. J.

2. CRUDE TARTAR.—What is the process for purifying crude tartar? A. K. F.

3. BORING AND TURNING.—Why cannot a lathe be run at the same speed in boring as in turning? C. P. A.

4. MEERSCHAUM POLISH.—What is a good substance and method for polishing meerschaum? I. B.

5. BAND-SAW.—Will a band-saw run to the highest part of a pulley the same as a leather belt? "If so, why so? and if not so, why so, also?" BUNSBY.

6.—JAPANNING ZINC.—How can japan be made to adhere to zinc as it does to iron?

ANSWERS TO QUERIES.

A. R. C., OF ILL.—We have examined your plan of stationary water-tanks in which the water for extinguishing fires is kept under a high pressure by compressed air, and are sorry to say we do not discover anything patentable in it. The idea is a very old one.

L. M. P., OF N. J.—The fact that a body is in motion does in no way interfere with the action of gravity upon it. Forces act independently of each other. No matter how fast a sphere might be revolved upon its axis, it would fall to the earth with just as great velocity as one not so revolved and falling from the same hight.

A. L. W., OF VT.—Your turbine step has too small bearing surfaces. That is the reason it burns out in spite of all that you can do. Make the bearing twice as large, and you will have no further trouble.

J. T., OF VA.—A trade-mark is often the only way in which a manufacturer can protect his business from those who would reap where he has sown. There are trade-marks in this city you cannot buy for $50,000. The registering of trade-marks constitutes an important part of our business.

R. J. F., OF MICH.—We believe pipes carrying high steam may ignite, or at least assist in igniting, parts of buildings, especially if these parts are of *pine*. We have seen specimens of such wood, which have been in contact with steam-pipes, and which were more or less charred. We therefore advise extreme caution in this matter. If we were going to heat a building with steam, we should not use more than four or five pounds pressure. This is ample with well-arranged pipes to promote proper circulation. There is moreover no economy of fuel in using high steam for this purpose, as is supposed by some.

BALLOON VARNISH.—G. V. asks for a balloon varnish. Take equal parts by weight of india-rubber and boiled linseed oil, cut the rubber in small pieces, and melt in the oil. In applying the varnish, thin with spirits of turpentine.
J. W., of Pa.

STEATITE.—I will answer C. H. V. that some of the industrial uses of steatite are in the manufacture of porcelain and glass, for polishing, and as an anti-friction material.
T. H. W., of S. C.

TEMPERING SPRINGS.—This is a very simple operation. Let C. T. heat them to a cherry red, and plunge them in cold oil. This will harden them sufficiently. Then blaze off the oil three times, and the springs will be found to have the right temper.
J. P., of N. Y.

SOLDERING OLD TINWARE.—To do this well use sal-ammoniac—chloride of ammonium—before using the zinc dissolved in muriatic acid—chloride of zinc. If J. B. will try this, he will find the difficulty he speaks of removed.

CISTERN WATER.—All water flowing from roofs should be filtered through gravel and charcoal before it enters the cistern, if the water be designed for drinking. Let W Van B. provide himself with casks sufficient to hold the water that will not pass the filter (described below) during the time of rain-fall. For a filter take a forty-gallon sirup cask or whiskey barrel. Put in a finely perforated shelf a third of the way from the bottom. The perforations should be about a quarter of an inch in diameter, and there should be as many as will leave the shelf strong enough to support the gravel and water. Place on the shelf first a layer of charcoal in coarse lumps, then level up with gravel; then a layer of pounded charcoal, not too fine, say averaging the size of peas, with such finer particles as will naturally be found in charcoal so broken; then another layer of gravel, and so on, alternating the gravel and charcoal in layers about an inch thick, till within six inches of the top, finishing with the gravel. Sink this in the ground, and connect the bottom with the cistern. Connect the receiving tanks at the bottom in a series, the first of which takes the water from the roof, and the last runs into the filter. If your querist follows these directions, he will be grateful to H. P. L., of Ky.

How To Secure Patents.

ADVICE TO INVENTORS.

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Immediately upon receipt of the model and fees, as above, the application will be prepared, and the papers returned for the signature and oath of the Inventor. The agency fee charged by BROWN & ALLEN is from $25 upwards, according to the labor involved, but in all cases their charges will be as moderate as possible. A great advantage of our agency consists in the fact that each case before it is sent to the Inventor is thoroughly supervised by one of the principals.

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The official caveat fee is $10, and our fee for preparing all the necessary documents is from $10 to $15. Citizens only, or aliens who have resided in the United States one year, and made oath of their intention to become citizens, can file caveats.

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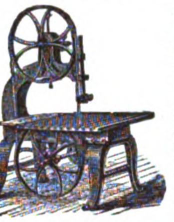

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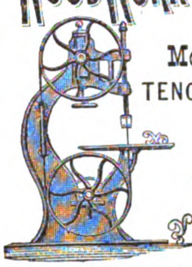

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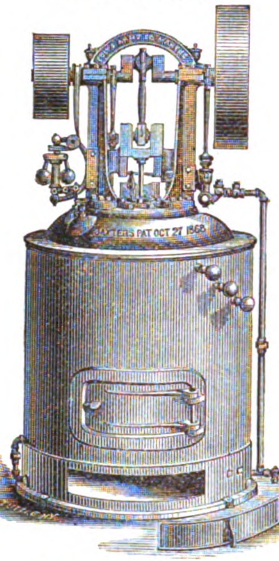

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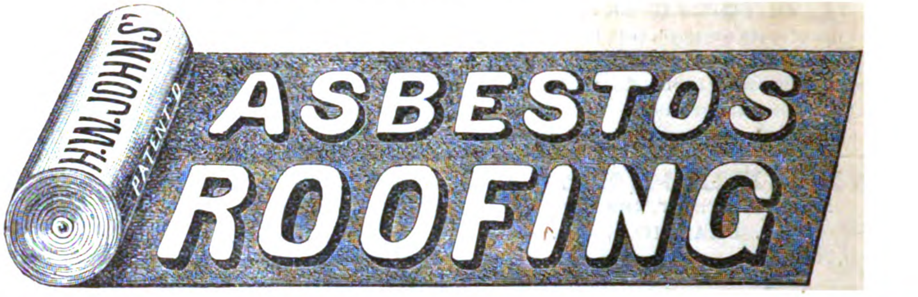

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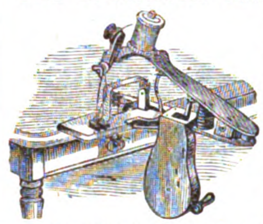

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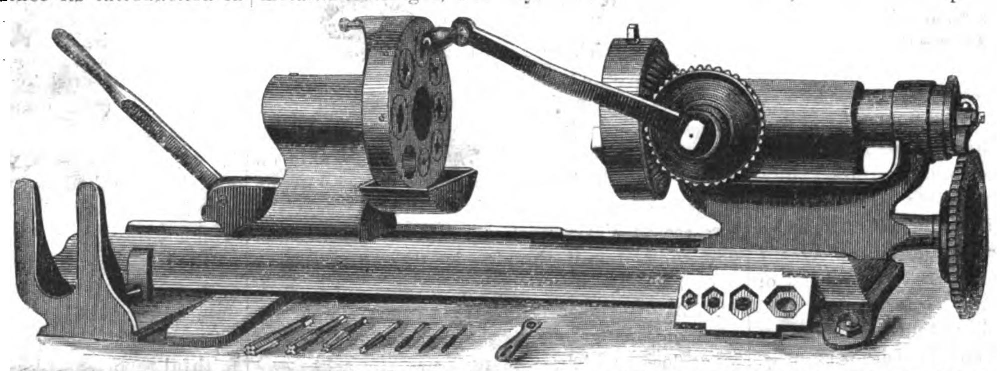
VOLUME XIV. New Series. | NUMBER 25. | NEW YORK, JUNE 19, 1872. | $2 00 PER ANNUM IN ADVANCE. SINGLE COPIES FIVE CENTS.

Grant's Patent Hand or Power Bolt-cutter and Drill Combined.

THIS useful machine, lately improved as here represented, seems likely soon to come into general request for blacksmith and repair shops, where heretofore the ordinary stocks and dies have been regarded as the only available tools for threading bolts. It does its work with far more rapidity and precision than is possible by hand, and is compact enough to be conveniently placed and used almost anywhere.



GRANT'S PATENT HAND OR POWER BOLT-CUTTER AND DRILL COMBINED.

During the two years since its introduction in New England it has received very hearty tokens of appreciation from its purchasers.

It is claimed that it will do at least five times the work that can be got through in the old way, besides giving the great superiority of thread which machine-work always possesses over that done by hand.

Seven of Grant's patent adjustable dies are so placed in the face of a disk-shaped head that each size can be brought in line with the chuck as required. Rods of any length can be passed through the hollow spindle of the improved machine and threaded. An ingenious nut-holder enables square or octagon nuts of various sizes to be held in the head and tapped.

The machine is also a blacksmith's drill, having a ratchet-feed capable of being regulated to run fast or slow. It is changed from bolt-cutting and tapping to be used for drilling by sliding off the die-holder and replacing it with the rest.

Messrs. Wiley & Russell, of Greenfield, Mass., the manufacturers, also make larger machines, as well as machines for threading gas and water pipe on the same principle.

The general construction of the machine was patented Sept. 20, 1870, and a patent on the dies was secured Oct. 24, 1870, both through the "American Artisan Patent Agency."

LIQUEFYING DEAD BODIES.—A certain M. Donac has recently laid before the French Academy of Sciences a project for liquefying dead bodies and transforming them into a sirup without color or smell. According to his calculation, a moderate-sized man could be got into six bottles. The size of each bottle is not stated, but the *Paris Journal* appears charmed with the idea, and exclaims, "What an opening for the exercise of filial piety!"

Cochran's Carbon Lubricating Metallic Cartridge.

THE lubricating material in this cartridge is carbon in that form known as graphite or plumbago, the finest quality of this material being employed. This marked innovation upon the old practice, which was patented through the "American Artisan Patent Agency," May 28, 1872, by Mr. John W. Cochran, of New York City, originated as follows:—

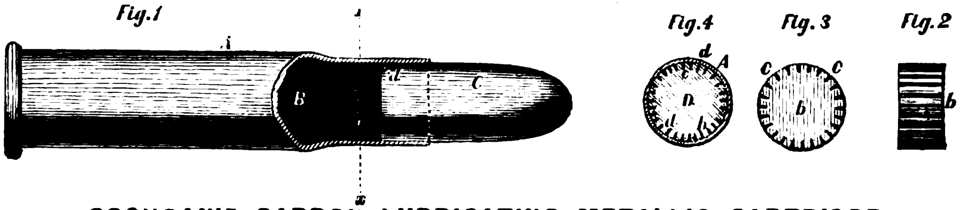
Grease is now used exclusively for lubricating metallic cartridges, and oxydizes all metallic substances coming into contact with it. On a large number of metallic cartridges which have been made several years, the grease decomposes, and an acid forms which oxydizes and renders worthless the cartridges. To such an alarming extent has this been the case, that the necessity of entirely stopping the manufacture of metallic cartridges until some harmless lubricant could be adopted, has been seriously entertained.

To remedy effectually this fatal defect, the Superintendent of the United States Rifle and Cartridge Company, Mr. John W. Cochran, invented a method for combining plumbago with metallic cartridges by a new and ingenious process. Pure plumbago is one of the most perfect lubricants in the world, and the only lubricant known that does not oxydize. It is a non-conductor of heat, and is entirely free from all acids. The necessity, therefore, of its immediate and exclusive adoption for lubricating guns seems obvious.

In the accompanying engravings, Fig. 1 represents a longitudinal section of a cartridge having the invention applied to it; Fig. 2, an edge view of a wad or cleaner and lubricator used in the cartridge, showing the same before being finished and inserted in the shell of the cartridge; Fig. 3, a face view of said wad-cleaner and lubricator under similar conditions; and Fig. 4, a transverse section of the cartridge at the line, *x x*, in Fig. 1.

The wad-cleaner not only operates during its expulsion with the ball to clean out the bore of the gun, but also to lubricate and so facilitate the discharge of a succeeding ball, or, in other words, to keep the bore of the barrel in both a clean and slippery condition. This double function of the rod, whereby it acts both as a cleaner and lubricator, is effected in part by the yielding or elastic character of its body, and in part by the plumbago or other lubricating powder with which said body is charged.

A represents the shell of the cartridge; B, its charge; C, the ball; and D, the lubricating-wad or cleaner. This wad or cleaner is composed of a plug or body, *b*, of cork, wood, or other suitable yielding or elastic material, made cylindrical to correspond with the shell, but of somewhat larger diameter than the interior of the latter. Such body is then nicked or serrated at its edge, as represented in Figs. 3 and 4, and the whole rolled in powdered graphite or plumbago, or such lubricating substance is otherwise forced into the cuts or cavities, *c*, in the body, and the latter or its periphery thoroughly charged with the powder. This being done, the wooden wad or cleaner is compressed with the grain into three-quarters its original diameter, and the plumbago or lubricating powder, *d*, securely held in the cuts or recesses, *c*, in the body.



COCHRAN'S CARBON LUBRICATING METALLIC CARTRIDGE.

When the charge is exploded in the cartridge, the lubricating-wad or cleaner, D, follows in the wake of the ball, the gases acting upon the latter only through the wad, which, by reason of its compressed condition in the shell, and elasticity when out of it, forms such a close fit to the shell and to the bore of the barrel and its grooves, that the gases cannot pass the wad to impair its action, but the wad in passing through the bore not only wipes it out, but deposits over its whole surface a thin film of the plumbago.

We hazard the opinion that this is one of the most important inventions which has been brought out during the past decade. Its importance will hardly be appreciated by those unacquainted with the present status of metallic cartridges, as hitherto made, in the estimation of various governments. So low has the reputation of these cart

ridges fallen, that their abandonment seems almost certain.

In Mr. Cochran's invention we see nothing objectionable, while it appears to obviate entirely the fatal defect of the old-style cartridge. Parties desiring further information can address the United States Rifle and Cartridge Co., at their offices, 164 and 166 Fulton Street, New York.

The Recent Eruption of Vesuvius.

THE following is the substance of a lecture delivered at the University, Naples, by Prof. Palmieri, on May 9, as reported by the London *Times'* correspondent:—

"Great interest was excited by it. Several thousands assembled, and on Prof. Palmieri entering the hall he was received with a round of applause. The terrible conflagration of the 26th of April, said the Professor, may be regarded as the finale of the eruption which began on the 1st of January, 1871, and has lasted, with alternations, up to the present time. It generally happens that the eruptions, which are small and gentle at their commencement, terminate with great violence, carrying destruction to human dwellings and devastation to the country. Among the most fearful eruptions which history records was that of 1631. It is related that on that occasion 4,000 human beings were killed, and 6,000 animals, cattle and sheep. Three centuries had elapsed since the mountain had given signs of activity; grass grew in the very crater, and shepherds took their flocks there to pasture. Thus it happened that, taken unexpectedly, many were swallowed up in the abyss which was opened; many were drowned or buried in the fiery flood, and others were destroyed by the pumice and burning stones which were vomited out of the summit and from other mouths. In strong centrical eruptions—by which is to be understood those which come from the upper cone of Vesuvius—great fissures are usually produced, which eject matter from as many different mouths, the lowest of which are the most dangerous. Such was the case with the recent eruption; for on the night of the 26th of April a mouth was opened in the Atrio del Cavallo, in the long fissure which had been made previously. The opening of this mouth formed, as it were, a hill in the Atrio del Cavallo resembling a chain of small mountains, and from underneath the lava issued calmly and rapidly, like a river of fire, while from the principal cone was ejected a continuous and violent shower of lava, smoke, ashes, and other fiery projectiles, which rose to the height of 1,500 meters (between 5,000 feet and 6,000 feet), while the mountain thundered terribly. Many had gone on that day and evening to see the lava, several of whom the Professor had endeavored to dissuade from entering the Atrio del Cavallo. Those who arrived later and remained until after midnight became the victims of their curiosity. Between two and three o'clock in the morning the Atrio opened with a fearful roar, and from the new mouth issued the lava with great impetuosity, wrapped in a cloud of 'boiling' smoke, ashes, and red-hot stones. Those wretched persons who were there were scalded by the smoke and wounded by the projectiles; some of them died immediately, others later. Of the others who remained on the farther side no traces remained, they having been swallowed up and buried by the burning stream. Those tremendous disasters may be foreseen and prevented, but a good service of guides is necessary; moreover, the Observatory should be well arranged, well organized, and good employees appointed to remain on the mountain during the eruption to give the alarm. On the night of the 26th of April, the lava precipitated itself into the Fosso della Vetrana, and, descending on the incline of the mountain over former beds of lava, invaded S. Sebastiano, Massa di Somma, and Coreola in the Cupa Giorvano, so-called because, as it is said, that famous painter had a villa there. From 1852 to the present time the lava has filled up the Fosso della Vetrana to the height of 200 meters; if further additions be made hereafter, the Observatory must be destroyed, as the last lava is only a few meters under its level. The lava here has the breadth of a kilometer, and on the banks of this river of fire—a remarkable and novel phenomenon—small craters have been formed by the lava, which thundered like the principal crater, and ejected smoke, ashes, and stones to the height of 70 or 80 meters. These observations are of great assistance to science, as they show the course of operations in the interior of Vesuvius. I trust, said the Professor, that the lava will not make me pay dear for this good service by invading the Observatory. The velocity of the lava varies from 180 meters a minute to a few millimeters, depending much on the condition of the land, being quicker on the incline, less so on the plain and where there are obstacles. Issuing in a liquid form from the mouths, it runs with great velocity, but slackens its pace as it advances, cooling gradually, and forming, as it were, a skin on the surface. This increases in solidity, and so the progress of the stream is diminished. When the lava ceased, Vesuvius continued to eject ashes and pumice, and still thundered; then the roaring ceased, and the rain of ashes decreased in quantity. Afterwards came heavy storms, which are commonly dangerous, as they are the occasion of great floods which, carrying down the ashes and pumice which cover the mountain, complete the ruin of the lands which have been spared by the lava. After the eruption of 1631, the floods were so strong that the damage done by them was not less than that occasioned by the lava, and the lands of those who suffered were exempted from taxes for ten years, like those which were damaged by fire.

"There are some who think—and the opinion is general among the agriculturists of the Vesuvian district—that the ashes are beneficial to the land as manure, but that they injure and sterilize it if water be added. The analysis of these ashes shows that a portion is soluble in water, another part not. This has the same properties as the contemporaneous lava, and is a species of silicate which may be useful to the land. After the eruption of 1812 there was an extraordinarily abundant harvest in the Puglias, and it was attributed to the ashes of Vesuvius which had been carried there by the wind. The ashes soluble in water, however, containing chloric acid, sulphuric acid, salmarina, burn land and wither vegetation. The beautiful country near Vesuvius which had been exposed to the recent conflagration is now a scene of squalid desolation. The harvest of this year is absolutely lost, and of that of next year we cannot indulge any cheerful hope. During the late eruption a report was spread in the city giving rise to great alarm, that the crater of Vesuvius had become an electric pile, and that at a certain hour a strong earthquake would shake Naples to its foundations. That report was exaggerated, but the currents of electricity developed in the volcano were very strong. These phenomena do not accompany all eruptions. In this, the latest, the Professor observed a large quantity of lightning which flashed in the great pile of smoke and ashes which rose from the crater. The noise which accompanied this lightning varied according to the length of its duration. When short, the noise was full and round, so to speak; when it was longer it produced a sound which was dry and hissing like that of tearing paper. The lightning is generated by the violent ejection of smoke and ashes, by means of which the electric current is established. The lava is now firm; is spent and yet smokes—not to be wondered at after so recent an eruption. We have seen the lava of 1858 still smoking in several places. These jets of smoke are called 'fumaroli.' These smoke-holes are communications between the upper crust of the lava which has hardened and the internal mass still incandescent. Around these holes are formed sublimates of oxyd of copper, of chloric acid, of sal ammonia, of sulphur, etc., which invest the lava with forms and colors at times the most beautiful. The Professor said he had analyzed the smoke which rose from the lava, and had discovered that it dissolves in salt water. From this he inferred that the waters of the sea are disturbed by those terrible convulsions, and are mingled with the fire. At the conclusion of his lecture Palmieri said that on the evening of the eruption Vesuvius appeared to sweat fire through every pore, which by night appeared like so many specks of flame attached to the back of the dark cone; by day those flames were changed into smoke. Palmieri thanked the authorities and all others who had manifested so lively a sympathy for him, which had well repaid him for the labor and anxiety he had undergone for the benefit of science. What I now send is, says the correspondent, of course only the digest of a lecture which will, no doubt, be published. It is, however, a faithful report, as I have been permitted to translate some notes which were taken on the occasion. Many addresses from public bodies have been forwarded to Palmieri expressive of admiration, and his Majesty has sent him a distinguished decoration—the Grand Cross of St. Maurice and Lazarus."

Absinthe.

THE *Pall Mall Gazette* gives this account of the way in which the French came to use enormous quantities of absinthe:—Except to medical men absinthe was unknown prior to the Algerian expedition, in the reign of Louis Philippe; but when the soldiers were at Constantine and Oran, and suffering greatly from fever, the doctors recommended that absinthe should be mixed with their wine, as it was much cheaper than quinine. During the entire campaign the soldiers drank this mixture, and afterward retained the custom, which first appeared in France at Marseilles, whence it rapidly spread through the country, and settled permanently in Paris.

A Revolution Backward.

WE find the following in an exchange:—Revolutions sometimes do move backwards, in spite of the old adage to the contrary. As a rule, the stage-coach went out of fashion as soon as the rail-car came into fashion. Not only did the steam-car drive the stages from the turnpikes and highways, but the horse-cars chased away the omnibuses from the streets in the cities where they were laid. There is now, however, a disposition to go back to the old ways of traveling. In this city, omnibuses run in opposition to the horse-cars on many of the streets, or in streets parallel to them, and are preferred by large numbers of people. It is said that stage lines have been revived in England, and in a

great many places where public coaches have not run since railway lines were established. There are no less than seven extensive lines of stage-coaches running out of London to various parts of the country, through the same places that can be reached by steam-cars, and they are very generally patronized. There are several good reasons for thus going back to first principles. The coach is less monotonous than a rail-car; the highway presents much finer views of the country than the railroad; the stage calls at the door and takes the passengers, and delivers them where they wish to go at the terminus of the route. Lastly, the driver of an old-fashioned stage is, or at least was, the most obliging man to be found, in which respect he stands in marked contrast with the railway employee, whatever his capacity.

The Barron Steel Process.

THE Barron process for the manufacture of steel tools, which is now attracting considerable notice, and which is represented to be more simple and economical than the Bessemer process, was, says the *Iron Age*, invented by Mr. Thos. J. Barron in 1868. T. B. Scowden, engineer of the Louisville and Portland Canal, early took an interest in the invention, and through his efforts a company was formed in Louisville to test its merits and introduce to the trade steel tools made in accordance with Mr. Barron's methods. After devoting two years to careful experiments and study of the conditions of success, the manufactory was ready to begin, and did begin, operations on the 1st of March last, and now employs forty hands. Thus far the success is reported to be very encouraging, and enlargement of the establishment is in contemplation. From an article in the Louisville *Commercial*, we obtain the following particulars respecting the process:—Tools, such as axes, hatchets, hoes, and adzes, to the manufacture of which chief attention has been paid, are first fashioned of iron by the usual methods. They are then placed in revolving drums, where the roughness and foreign substances which belong to them when they come from the molds are worn off by attrition. They are then packed in layers in ir n boxes, closely covered with clay, and subjected to the action of oxyd of iron and chemical substances, which decarbonize the iron of which they are composed. Herein is the secret of the process. In these boxes the tools are subjected to an annealing process, which lasts for from three to six days, when, being decarbonized, purified, and malleable, they are ready to be changed into steel. A retort, holding about a tun of the tools, occupies the center of a large oven, which is kept at a temperature just below the point of fusion. In this they absorb gasoline, introduced from a tank near by, and pure charcoal gas, generated in a retort on the top of the furnace. The iron becomes steel in from eight to ten minutes, when the tools are removed to be tempered, ground, and polished for the market. It is claimed that this process is the quickest and the best yet discovered. The company is now melting about a tun and a half of iron a day, and as soon as proper facilities are provided will begin the manufacture of steel rails. Professor Newberry, of Columbia College, New York, makes the following report of a practical test of the steel produced in this way:—"With tailors' shears cast in shape, made malleable, and then converted by the Barron process, I have cut Florence silk so nicely as to prove the edge perfect; then, with the same shears, have cut up sheets of tin and untempered steel; returning to the silk, have found the edge wholly unimpaired, and this after a repetition of more than twenty times." Arrangements are making to start a large establishment at Pittsburg for the manufacture of tools by this process.

Oriental Telegraphy.

CONSIDERABLE extensions of the telegraph are in course of being carried out in Japan, and it is expected that very shortly all the important cities and towns of Japan will be connected by telegraph.

Telegraphs were introduced in Aleppo, Syria, a few years ago by the Turkish Government; but let not any one suppose that telegraph means the same in Turkey that it does in the West. The motto of everybody in that country is "*yavash, yavash*" (slowly, slowly), and even electricity is handled by these phlegmatic Turks in accordance with their time-honored customs. Electricity is altogether too fast for the average followers of the prophet: but, as it pays no heed to "*yavash, yavash*" after it is started, the Turkish operator delays the message as long as possible at one end, and the Turkish carrier at the other end waits till a quantity of telegrams have accumulated, and then devotes half a day to delivering the arrivals for the week. One gentleman recently telegraphed to Aleppo from Antioch, distant about one hundred miles by telegraph route, and got his answer in just forty-eight hours, though his agent in Aleppo answered immediately.—*Journal of the Telegraph.*

The Log-wood Test for Alum in Bread.

THE following is Mr. Horsley's test for alum in bread, as communicated by him through the *Chemical News*:—

(1.) Make a tincture of log-wood by digesting for eight hours 2 drachms of freshly cut log-wood chips in 5 ozs. of methylated spirit in a wide-mouthed phial, and filter.

(2.) Make a saturated solution of carbonate of ammonia in distilled water.

A teaspoonful of each solution mixed with a wine-glassful of water in a white-ware dish forms a pink-colored liquid. Bread containiug alum immersed in it for five minutes or so, and stood upon a plate to drain, will in an hour or two go blue on drying; but, if no alum is present, the pink color fades away. If, on drying, a greenish tinge appears, that is an indication of copper, as carbonate of ammonia produces that color, but never a blue.

As a counter-check for iron, a piece of the moist blue-colored bread may be drenched with a few drops of glacial acetic acid, when that containing iron is bleached of a dirty-white color, but with alum a rose-pink or slight buff color will be observed.

Or it may be tried another way, thus:—Take a piece of the bread in its plain state, and having digested it in dilute acetic acid for an hour or so, press out the liquor and filter; then put in a lump of carbonate of ammonia, and, when all effervescence ceases, add to the clear liquor a few drops of solution of sulphide of potassium or sodium. If iron is present, it will be indicated by a dark color, there being no color produced with alum; but the addition of a little tincture of log-wood immediately reveals it.

I might even go further, and say that, if necessary, you may quantitatively estimate the alumina thus:—Take, say, ¼ lb. of crumb bread, digest it in a clean basin with some dilute acetic acid, and allow it to stand a few hours; then break up the mass and pass the liquor through a glass percolator, the rim being covered with calico, repeating the percolation two or three times until the liquor is clear. Throw in a lump of carbonate of ammonia to saturation, and add tincture of log-wood in excess, when, if alum is present, a dark-blue color will be produced, with a flocculent blue precipitate on standing awhile. Collect this precipitate on a filter, wash it off into a dish with dilute nitric acid, and evaporate the red liquor to dryness. Collect the residue in a small Berlin crucible and ignite it at a red heat, when a white powder will be obtained, consisting of alumina, with possibly a little lime; treat this with liquor potassæ to dissolve out the alumina, mix with a little water, filter, and boil with carbonate of ammonia to obtain the pure alumina.

Fresh Vegetables and Sweet Salads.

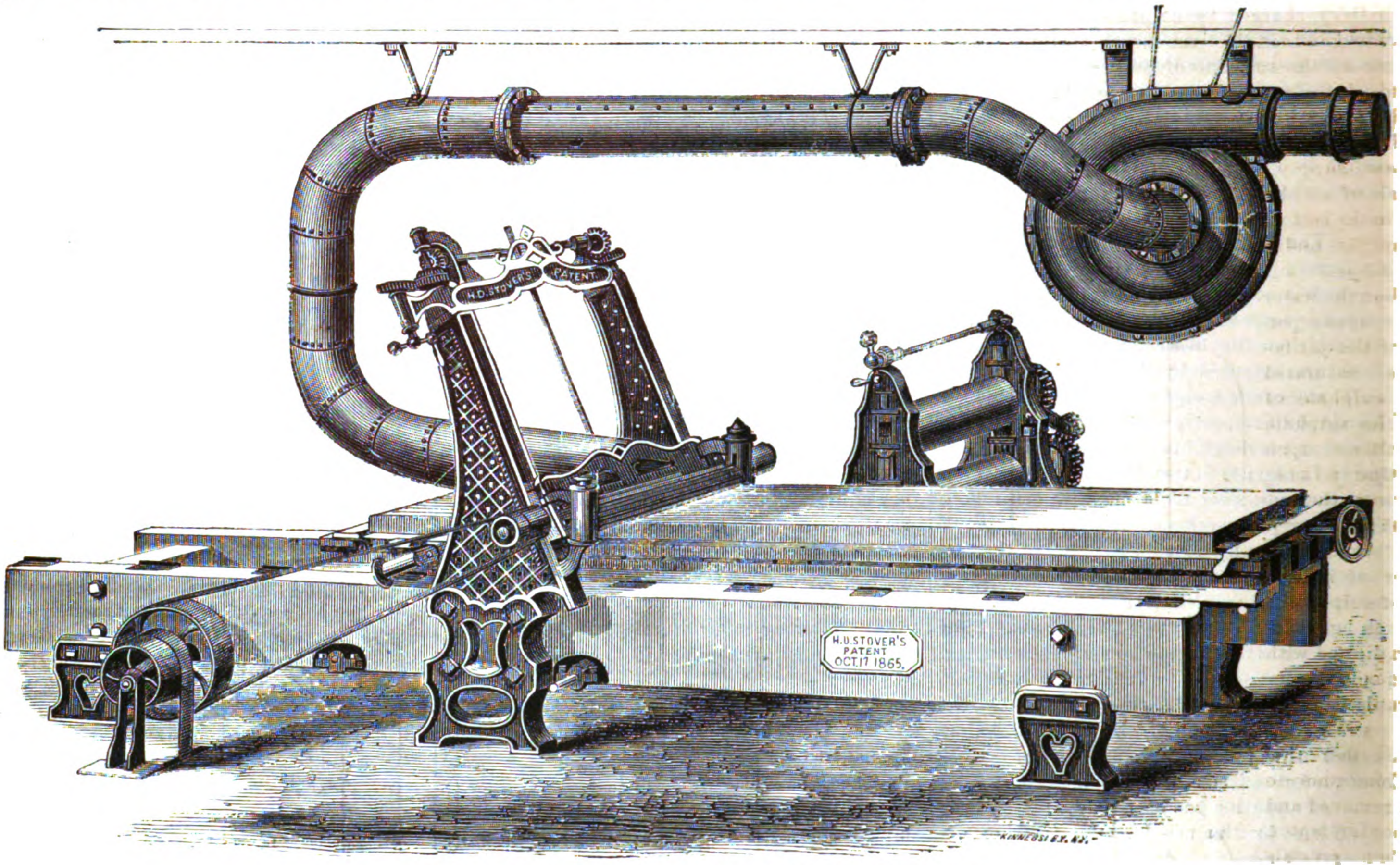
THOSE who value fresh vegetables and sweet salads will have none washed in the garden. Neither the one nor the other should be washed until they are just about to be cooked or eaten. Even potatoes lose flavor quickly after being washed, so do carrots and turnips; while water will speedily become tainted in summer in contact with cauliflowers and cabbages, and thus destroy their freshness and flavor. The case is still worse with salads. If washed at all, it should be only just before they are dressed, and they should be dried and dressed immediately. Nothing ruins the flavor of vegetables, and renders good salading uneatable, sooner than water hanging about them. If lettuces are quite clean, they make the best salad unwashed; but if washed the operation should be done quickly, and the water instantly shaken out, and the leaves dried with a clean cloth. But, alas! how often are they cut and washed in the garden in the morning, and pitched into water in the scullery sink until wanted. What French *artiste* would be mad enough to rinse out his salad juice, and then recharge his lettuces and his endives with semi-putrid water?

The best practice is simply to remove all superfluous earth by scraping or rubbing, and all rough tops or leaves by cutting. Enough tender leaves may still be left on cauliflowers and brocoli to overlap the flowers. Salad should be sent in from the garden with most of the outside leaves and main root on. The tender leaves are easily tainted and injured by exposure, and if the chief root is cut off sharp much of the juice oozes out at the wound. Where vegetables and salading have to be bought from a town greengrocer the conditions are altogether different. Not only washing but soaking often becomes requisite to restore something like pristine crispness.

Electric Gas-lighting.

THE *Telegrapher* states that, in order to insure, as far as possible, the safety of the gunpowder works at the Royal Arsenal, Woolwich, England, the gas-lamps are in future to be lighted by means of electricity. This process has already been adopted at the cannon cartridge factories and several other workshops, where the quantity of explosive material is necessarily large, and it is understood to be intended to apply this system to all the buildings in the Royal Arsenal where work of a similar nature is carried on. The whole of the lamps by which these workshops are lighted are invariably fixed outside the windows, and open only on the outside of the building; but it has been thought that lighting them by the ordinary means is nevertheless attended with danger, and their ignition by wires in connection with a galvanic battery will be the means of insuring greater security against accidents.

Stover's Combination Wood-planer, with Attached Dust and Shaving Collector.



COMBINATION PLANER AND DUST COLLECTOR.

THE accompanying engraving illustrates one of the tools of the Stover Machine Co., whose advertisement will be found on our outside page. The engraving shows the machine arranged for planing straight and out of wind, and squaring up and surfacing heavy and dimension timber or boards. The platen is moved backwards and forwards by means of a rack-feed, and so arranged as to run back twice as fast as forward, being moved either way by simply moving a lever; and the jar of starting a piece of heavy work is wholly obviated, thus making it impossible to strip any teeth.

It is also so formed as to make a heel or cap iron for the cutting knives, being adjustable, like a hand planer, for the purpose of cutting fine or heavy, in either hard, soft, straight, or crooked-grain wood, as the case may be. The heel iron, formed on the cutting cylinder, is so constructed as to break the chip and cause it to be thrown from the cylinder as soon as cut, thus making the action of the cutting cylinder perfectly free by the action of the recesses and pressure edge. The cutting cylinder is moved by means of a screw attached to *each end of its crosshead*, which are placed outside of the posts, away from the dust and shavings, and thus securing it exactly parallel with the face of the platen, either in its elevation or depression. The cutting cylinder is run in long boxes, which are lined with Babbitt metal, and supplied with a new and superior arrangement for oiling the boxes, so they can never heat. The crosshead is secured to the upright posts by means of a gib, and can be adjusted very readily, thus preventing any side motion or insecurity; it is also arched in the center to allow the free exit of shavings.

The feed-rolls (Woodworth attachment), for surfacing only, are shown in the cut thrown out of gear, the position they occupy when not required for use; when wanted, the platen is run out of gear, and the feed-rolls are pushed into place, running into gear, and securing themselves perfectly solid; the time required to shift from planing straight and out of wind to that of surfacing being scarcely worth mentioning.

The shaving and dust collector is a valuable attachment, which keeps the air in the mill clean, and greatly adds to the comfort and health of the operator, while it obviates in a great measure danger from fire. The latter fact is appreciated by the insurance companies, which make liberal reductions in their rates where this appliance is used.

The dust is drawn by suction into a bonnet placed near the cutter, the blast being created by a fan blower. The loose combustible material is received by a chamber conveniently located, and by means of valves the blast is regulated to just the amount required. By proper construction of boiler furnaces all this material can be utilized as fuel.

The practical character of the device and its evident great utility will impress every man accustomed to running wood-working machinery. It is capable of being attached to any kind of machine used for planing or shaping wood. All the peculiarities of the planer and the dust collector are amply protected by numerous patents.

THE CALLAUD BATTERY.

IN consequence of the inconvenience experienced in the use of the Daniell battery from the deposit of copper upon the porous cell, M. Callaud, a clock-maker at Nantes, France, endeavored to discover some process by which it could be suppressed altogether without diminishing the force of the battery or lessening its constancy. In this effort he was entirely successful, for after a series of experiments he found that the difference in the density of pure water, or water charged with sulphate of zinc, and a solution of sulphate of copper, was sufficient of itself to cause an entire separation between them when placed in the same vessel. Accordingly, he constructed his battery by suspending a cylinder of zinc near the top of a glass jar, and placing a copper plate at the bottom, and then filling the jar with a saturated solution of sulphate of copper and a diluted solution of sulphate of zinc. The difference in the specific gravity of the two solutions causes them to separate at once and become superposed in the jar, the sulphate of copper occupying the lower and the sulphate of zinc the upper portions of the jar.

The chemical action which takes place in this battery is the same as in the Daniell. The zinc cylinder is oxydized by the oxygen of the water, and the oxyd combines with the acid set free by the solution of sulphate of copper, forming sulphate of zinc, which remains in solution, while the oxyd of copper, which was previously combined with the acid, being set free, is reduced to metallic copper, and is precipitated on the surface

of the copper plate at the bottom of the jar. The reduction of the oxyd to the metallic state takes place in the following manner:—The water of the solution furnishes oxygen to the zinc, and thus enables it to combine with the acid; while the hydrogen, which is liberated, again forms water with the oxygen of the oxyd of copper, with which it comes in contact, leaving the metal free. Hence but little gas is given off during the action of a battery charged by sulphate of copper, as the hydrogen is in this case mostly absorbed.

When all the sulphate of copper has been decomposed, the action ceases, and sulphate of zinc will be reduced upon the copper plate as a black powder. It is necessary, therefore, to provide a constant supply of sulphate of copper. A few crystals of sulphate of copper should always remain in the bottom of the jar undissolved.

When the water in the upper portion of the jar becomes saturated with sulphate of zinc, the sulphate crystallizes upon the zinc plate, stopping the action of the battery. The conducting power of a solution of sulphate of zinc is greatest when diluted with an equal quantity of water. Part of the solution should, therefore, be from time to time removed and replaced by water.

When crystals form on the top and sides of the cell, in consequence of the water being charged with sulphate of zinc, they should be removed with a damp cloth.

The bottom of the zinc cylinder should be four inches from the copper plate.

Half a pound of sulphate of copper is sufficient to charge a fresh cell of the Callaud battery, and to leave a portion of the crystals undissolved. A pint of water, at the ordinary temperature of the atmosphere, is capable of dissolving one-quarter of a pound of blue vitriol.

In starting a fresh Callaud cell, it is better to use a small quantity of the sulphate of zinc solution taken from some other battery, but if this cannot be readily obtained, a solution of Glauber's salt (sulphate of soda), or even common salt (muriate of soda), will answer. It is not necessary, however, to use anything but common water. In this case, the two poles of the battery should be connected together in short circuit for a few hours, when it will make its own sulphate of zinc solution.

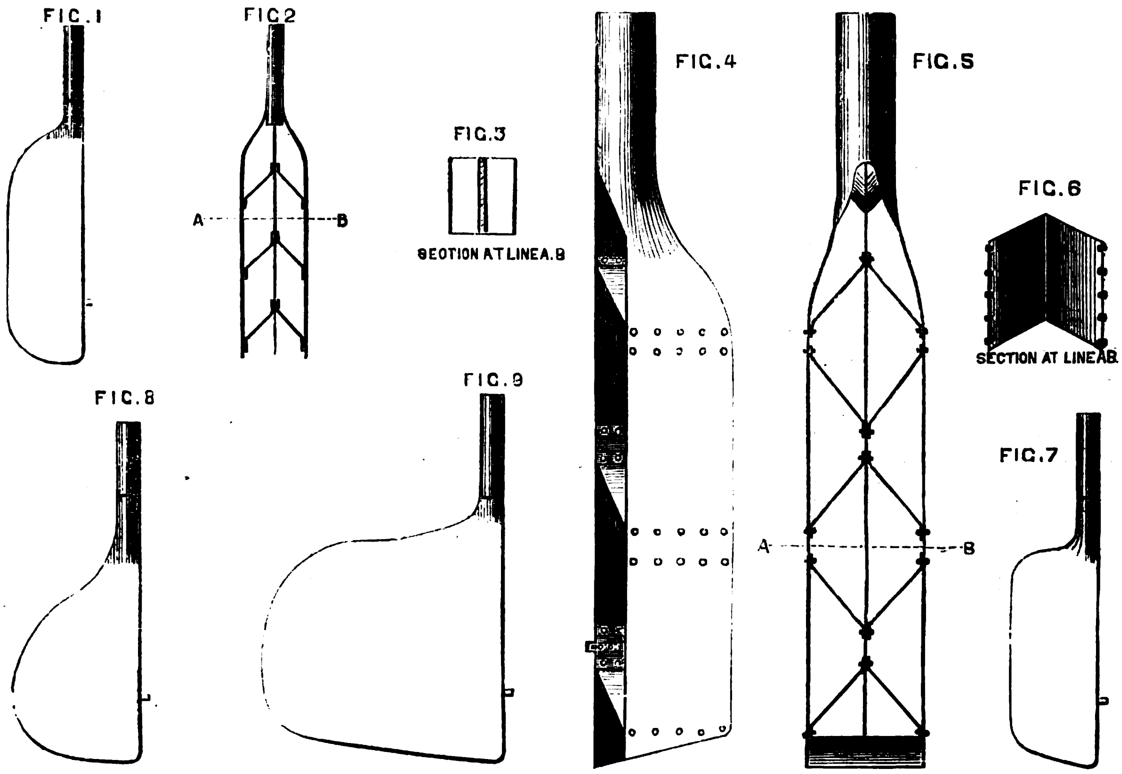
The cut on the preceding page represents an improved form of the Callaud battery, recently designed by Mr. Phelps, which is to go into general use upon the lines of this Company, in place of the bichromate of potash and nitric acid batteries.—*Journal of the Telegraph.*

Saunders's Improved Rudder.

IN the event of any sudden emergency arising, such as an impending collision, it is of the greatest advantage to a ship that she should answer her helm with ease and rapidity. Her ability to do this will depend upon two circumstances. One is the accuracy of her lines, or, in other words, her build, and the other the effective steerage power with which she is endowed. Supposing that her build is as perfect as the shipwright can make it, the whole question turns upon the remaining point, the adequacy of the steering power. This again involves in a great degree the form and dimensions of the rudder. To increase the width of the rudder in exact proportion to the length and breadth of the ship, so as to give her the desired facility for altering suddenly her course, would augment the size of the former to a degree that would imperil its safety, if not in fine weather, at any rate when struck by a heavy sea. Within the last few years the custom has been to reduce the width of the rudder from the part below the water-line as well as at the keel, and to extend the width at the center, probably with the idea that the further the steering surface is thrown out from the line of keel, the better it will act to turn the ship. The other assumption is that the nearer the steerage surface is kept to the line of keel, provided it be of sufficient area, the better; for under such an arrangement the rudder would be worked with less leverage power on deck, would be less exposed to the violence of a running sea, and free from vibratory action when in midships. It may be argued that the intensity of the rudder force upon the ship would be indicated by the strain upon the deck gearing as the helm is hove to port or to starboard, but this is scarcely a fair criterion, nor can it be a correct register of the influence produced upon the ship's track. Suppose, for instance, that the helm is hard over, that is, at the angle of 45°, and there was no stop on the post to prevent its being hove over unduly to 60° or 90°, the strain would be still increased on the post and on the deck gearing, whilst the power to turn would be proportionally diminished until it became *nil*, or nearly so, at 90° from the line of keel. Many consider that a hump-backed rudder possesses a practical advantage over a straight one, which is tantamount to assuming that the rudder power does not act uniformly from top to bottom wherever the current of water impinges on its presented side.

It may be urged in favor of broad rudders that they are applied to river and canal craft with advantage, but this is consequent upon their shallow draught of water, as a rudder constructed on the ordinary principle for ships could not possibly afford the requisite steering surface, and it becomes indispensable to increase the width. In the engraving is represented a form of rudder invented and patented in England by Captain Robert Saunders, which is constructed on the multiplying principle, and is so arranged as to afford double or even threefold surface for the current of water to impinge upon, and will thus necessarily act more readily and with better effect.

The new form of rudder is shown in Figs. 1 and 6, and consists of three blades connected together by small diagonal pieces. That represented in Figs. 4 to 6 the inventor considers rather superior to the other, and is possibly better adapted to larger craft. The only difference is that the middle blade is not flush with the two outer ones, and the bracing is double instead of single. The ordinary shaped rudder is shown in Fig. 7, that belonging to the yacht type in Fig. 8, and the barge rudder in Fig. 9. Experiments were tried upon a model with the four different shaped rudders shipped on successively, with the view of ascertaining the relative time required by each to make the complete circle. Calling the ordinary rudder A, the yacht rudder B, the barge example C, and the proposed new form D, and representing the time occupied by A by unity, that of the others will be given by the following proportion:—A = 1, B = 0·89, C = 0·78, D = 0·70. The area of a single-bladed rudder could, of course, be increased indefinitely were there not a practical limit to its dimensions. Any infringement of these conditions would only decrease the steerage power of the rudder, besides causing heavy strain upon the gearing.—*Engineer.*



SAUNDERS'S IMPROVED RUDDER.

MANY adulterations in coffee can be easily detected, even if the taste is not a sure index. If a teaspoonful of genuine ground coffee be thrown into a tumberful of cold water, it will float upon the surface. Some substances used in adulterating coffee will sink at once.

Effects of Electricity on Milk.

MR. X. A. WILLARD, in his address before the Northwestern Dairymen's Association, gave the following interesting facts:—

Mr. Andrew Cross, the celebrated English experimenter, considered that the roots and leaves of plants were in opposite states of electricity. Some of his experiments in this direction are very interesting. He cut two branches from a rose-tree. They were as nearly alike as possible, with the same number of buds, both equally blown. An arrangement was made by which a negative current of electricity was passed through the other. In a few hours the negative rose drooped and died, but the positive continued its freshness for nearly a fortnight; the rose itself became full blown, and the buds expanded and survived an unusual length of time. Again, he was able to keep milk sweet for three weeks in the hottest weather of summer by the application of a current of positive electricity.

On one occasion, he kept fishes under the electric action for three months, and at the end of that time they were sent to a friend, whose domestic knew nothing of the experiment. Before the cook dressed them her master asked her whether she thought they were fresh, as he had some doubts. She replied that she was sure they were fresh; indeed, she said she would swear they were alive yesterday. When served at table they appeared like ordinary fish, but when the family attempted to eat them they were found to be perfectly tasteless; the electric action had taken away all the essential oil, leaving the fish unfit for food. However, the process is exceedingly useful for keeping fish, meats, etc., fresh and good for ten days or a fortnight.

Now, this is consistent with our observation and the facts known to every one in the habit of handling milk. When the condition of the atmosphere is in a negative electrical state, or shows a deficiency of positive electricity, a state of the weather which we designate as sultry, muggy, close, and the like, there is always difficulty in keeping milk sound. Even in good, healthy milk the fungus germs common to all milk increase and multiply with great rapidity, producing the common lactic acid fermentation or souring of the fluid; but in case fungi from decomposing animal or vegetable matter come in contact with the milk, rapid decomposition takes place, and we have rotten milk, putrid odors, and floating curds. The exposing of such curds to the atmosphere as well as the aeration of milk to improve its condition are both philosophical, because these minute organisms of fungi are affected by the oxygen of the air, which checks their development and multiplication.

The influence of electrical action is a question entirely new to the dairy public, but it is one concerning which I think some useful suggestions present themselves for our consideration. When the electrical equilibrium is disturbed, or when the state of the atmosphere indicates a preponderance of negative electricity, we are all made aware of the fact by its depressing influences. At such times it is important that we take more than ordinary care in the handling of milk; that it be kept out of harmful odors; that attention be given to its aeration, and such treatment be given it as shall be inimical to the growth and development of fungi. And again, the fact that milk may be kept sweet a long time in hot weather by electrical action, will offer a very important suggestion to inventors in the preservation of milk, and perhaps in the improvement of cheese factories. I believe that we are only on the threshold of the cheese-making art, and that, as we become more familiar with the laws of nature and their application, great progress is yet to be made in every branch of dairy husbandry.

Cutworm Trap.

A CORRESPONDENT of the *Prairie Farmer* speaks of pieces of boards put near young plants, where the worms will hide and may be captured, whereupon another correspondent communicates what he thinks a better plan:—

Cut up your old letters or copybooks, or some other stiff paper, into strips 5 or 6 inches long, and 2 or 3 inches wide, fold a strip round your fingers to give it shape, put your plant in the ground, fill up with fine dirt, pour a little water around the plant, and while the dirt is wet put your paper around it and push it in the ground. Then your plants are entirely protected. I have mentioned the best plan. Newspaper will do, and also mellow dirt without water. Any one will soon get up to using it so as to get along without any trouble. Do this and you need not look after your plants further; they are safe.

The same writer says that his plan of circumventing cucumber bugs is to take a newspaper and spread it over the vines, and lay a clod of dirt on each corner to hold it down. The bugs will not find the plants which grow well, and will finally grow through the paper or the paper will tear over them. The more flimsy the paper, the better.

Brooklyn Boiler Inspector's Report.

THE following annual report was handed in to the Police Commissioners June 9:—

OFFICE OF INSPECTOR OF STEAM BOILERS,
POLICE HEADQUARTERS,
BROOKLYN, May 28, 1872.

To the Honorable the Board of Police of the City of Brooklyn:—

GENTLEMEN:—I would respectfully transmit to you the annual report of the business executed in this branch of the Police department of this city, from May 1, 1871, to May 1, 1872, inclusive, containing, as will be seen in the tables annexed, the number of steam boilers examined, tested hydrostatically, and their condition; the number of applicants for certificates to take charge of stationary steam boilers; the number granted the same, and the number denied, as not possessing the requisite degree of experience:

STEAM BOILERS.	
Number examined	1,405
Number tested hydrostatically	1,043
Total examined	2,448
Number of steam boilers found defective	14
Number of steam gauges found defective	138
Number of safety-valves found defective	39
Number of gauge-cocks found defective	187
Number of leaky joints found defective	217
Number of steam boilers condemned and removed	23
Total number defects, all of which have been remedied by order of this department	678
STEAM ENGINES	
Number examined and found competent	621
Number examined and found non-competent	188
Total	809

Number whose certificates have been revoked by order of this department for insobriety and other misdemeanors, 12.

I am happy to state that there have been no accidents with steam boilers during the past year, and upon examination I find that the engineers as a class are improving in their knowledge of steam engineering.

In conclusion, I would say that the boilers in this city are in generally better condition than at any former period. Respectfully submitted.

[Signed] THOMAS F. POWERS,
Examining Engineer.

The Use of Lemons.

A CORRESPONDENT says:—I do not think there is a hundredth part of lemon-juice used generally as its valuable qualities would seem to commend. I know of nothing better as a stomachic corrective, as well as a strengthener of the nervous system. We all know that it is used for rheumatism, and I have no doubt it is also good for the gout, if taken regularly three times a day, and at least half a gill at a time. It can be taken in much water or little water, or no water at all. It is not unpleasant, one soon becomes accustomed to it, and would rather drink it than pure water. For the headache it is the best cure I have used; it will relieve it in from ten to fifteen minutes by a single dose. I would not advise less than half a gill at a time. I know people who take it as a preventive of disease and as a refreshment in hot weather. It quenches thirst also better than anything else.

There may be, however, excess in the use of lemons as in other things. The acid of this fruit —citric acid—is said to produce emaciation of the body when taken too freely.

Windmills for Farm Use.

MR. GEO. E. WARING, JR., in his Ogden Farm papers for June in the last *American Agriculturist*, devotes most of his space to detailing his experience with windmills in supplying water to his stock. The subject has a general interest not only because of its adaptability to a similar purpose elsewhere, but because there are thousands of situations where the power might be employed for the purposes of *irrigation*—a subject of increasing interest, and forced upon the attention of farmers more and more by the frequent recurrence of drouths.

The mill was located at a spring well, 800 feet distant from Mr. Waring's barn, and 35 feet lower than the foundation of that structure. It was from the manufactory of the "Empire" Company (located we believe at Syracuse), and cost $200 delivered at Newport, while the building on which it was placed cost $50 more. Mr. Waring and an ordinary mechanic put it up, guided in part by the printed directions. The stock to be watered averaged seventy head in winter and thirty-five in summer. Considerate neighbors, as usual, predicted its speedy collapse; but the mill worked well from the start, and did so admirably for three years, passing unharmed through the terrific gale of September, 1869. At the end of the third year it began to grow shaky, in consequence of neglect in screwing up loose nuts, tightening brace-rods, etc., when a gale inflicted $50 worth of damage. On being repaired, it worked a year longer, when it gave out—a wreck; but Mr. Waring's confidence in its utility was so great that he immediately ordered a new one, with "modern improvements." He is confident that by proper care the old one might have been made to do service twice as long as it did; and the new one, being much simplified in construction, he believes is more certain to last eight years, even with neglect, than one like its predecessor would be to last four. He made no attempt to apply it to other purposes, and while he only suggests that it might be, he is unqualified in his commendation where the circumstances are at all like his own.

We are glad to note this success in the use of a windmill because of its easy application in hundreds or thousands of similar cases, and because of its relation to the great problem of irrigation. On many farms a well, windmill, cistern, or an elevated vat, such as is used for supplying locomotives, might be so located that by the aid of pipes

or open ditches water might be supplied to considerable portions of the farm, or to adjoining farms even, during a season of drouth, the wind being utilized more or less through the year in filling large cisterns, from which pipes would conduct it so as to be used for irrigation, watering stock, or for household uses. In some cases several farmers could advantageously co-operate in the work, and sometimes even a neighborhood, the well, mill, and other fixtures of course being adapted to the demand to be made upon them. For market gardening or small-sized fruit farms, the system would be of immense service during such a spring as that just ended, and the cultivators employing it would possess advantages over their less energetic competitors which might more than pay the cost in a single season. The subject certainly is suggestive of many possibilities which are worth attentive study and investigation. Our drouths so seriously lessen the production of the country that some system of individual enterprise, or of co-operation, which shall even measurably diminish their effects, will be a public blessing.—*Cultivator and Country Gentleman.*

Discovery of a Subterranean Village by Dr. Livingstone.

A DISPATCH from Zanzibar, Africa, states that further information has been received from the interior regarding the whereabouts of Dr. Livingstone. The veteran explorer is still prosecuting his researches far into the interior of the country. The long-debated question of the Nile appears to be settled at last, the untiring energy and perseverance of the great traveller having been rewarded by the discovery of the true source of that river.

During his researches Dr. Livingstone has been fortunate in making numerous discoveries of a character entirely new to science, and has collected an abundance of material, the publication of which he intends shall take place in due time, and which must prove of the highest interest to the civilized world.

One of the most remarkable of the Doctor's explorations has been the discovery of an underground village, whose subterranean inhabitants differ largely in their habits and language from the other savage tribes of Central Africa. Dr. Livingstone is thoroughly investigating this strange people and their country.

Preparations are being made to have ample stores forwarded to him from Zanzibar.

The Remains of a Pyramid Builder.

A WRITER in the *English Mechanic* says that in the Etruscan vase room of the British Museum, in the bottom compartment of a cheap glass case, with no external mark to call attention to it, or to distinguish the relics from the old pots and pans surrounding them, lie the well-preserved mortal remains of "Mykerinus the Holy," the pyramid builder, the cotemporary of Abraham. Even with the help of a catalogue you will not readily find it out. While mushroom monarchs of yesterday are thought worthy of glorious shrines, the British nation thinks this treatment good enough for the remains of a mighty monarch of the days when the earth was young, who has left his stamp on its face in the shape of a monument of exquisite taste, which time seems powerless to destroy. His sarcophagus lies at the bottom of the Bay of Biscay, and it would be better for our credit if the body lay there also, decently buried within it. The object of the Museum authorities appears to be to overcome the monarch's aversion to return to dust. "Dust thou art, and unto dust shalt thou return," should be placed as a motto over the compartment. They seem to have about as much respect for the king as the historian of the kaliphs had, who records about the opening of the sarcophagus, "that they found in it nothing but the rotten carcass of an infidel," which, accordingly, they turned out on to the floor and left there. Would it be too much to expect that the remains should be at least removed to the Egyptian room and placed in an air-tight glass case, and that some pains should be taken to preserve them from the rapid destruction which exposure to the air must be bringing about? It would, I suppose, be too much to expect that anything in the way of harmonious surroundings should be added thereto, such as our neighbors would indulge in if they had it in the Louvre. The late Baron Bunsen made some sharp remarks, in his "History of Egypt," about our treatment of these remains, which should long since have shamed the authorities of the Museum into some action about them; but it takes a deal of kicking to move us Britons.

Colors and Health.

THERE are some colors that no person can be cheerful and elastic in spirit if their rooms are tinted with them. A correspondent of a scientific paper, the *Builder*, states that he had occasion for several years to examine rooms occupied by young women for manufacturing purposes, and he has observed that while the workers in one room would be very cheerful and healthy, the occupants of a similar room, who were employed on the same kind of business, were all inclined to be melancholy, and complained of a pain in the forehead and eyes, and were often ill and unable to work. The only difference he could discover in the rooms was that the one occupied by the healthy workers was wholly whitewashed and that occupied by the melancholy workers was colored with yellow ochre. As soon as the difference struck him, he had the yellow ochre washed off the walls and then whitened. At once an improvement took place in the health and spirits of the occupants. He pursued his observations and experiments, not only in large manufactories, but also in small apartments and garrets, and he invariably found that the occupants of such apartments, when they were colored yellow or buff, were less healthy than their neighbor in whitened rooms, and that when the yellow hue disappeared the low spirits and ill-health went with it.

Krigar's Cupola Furnace.

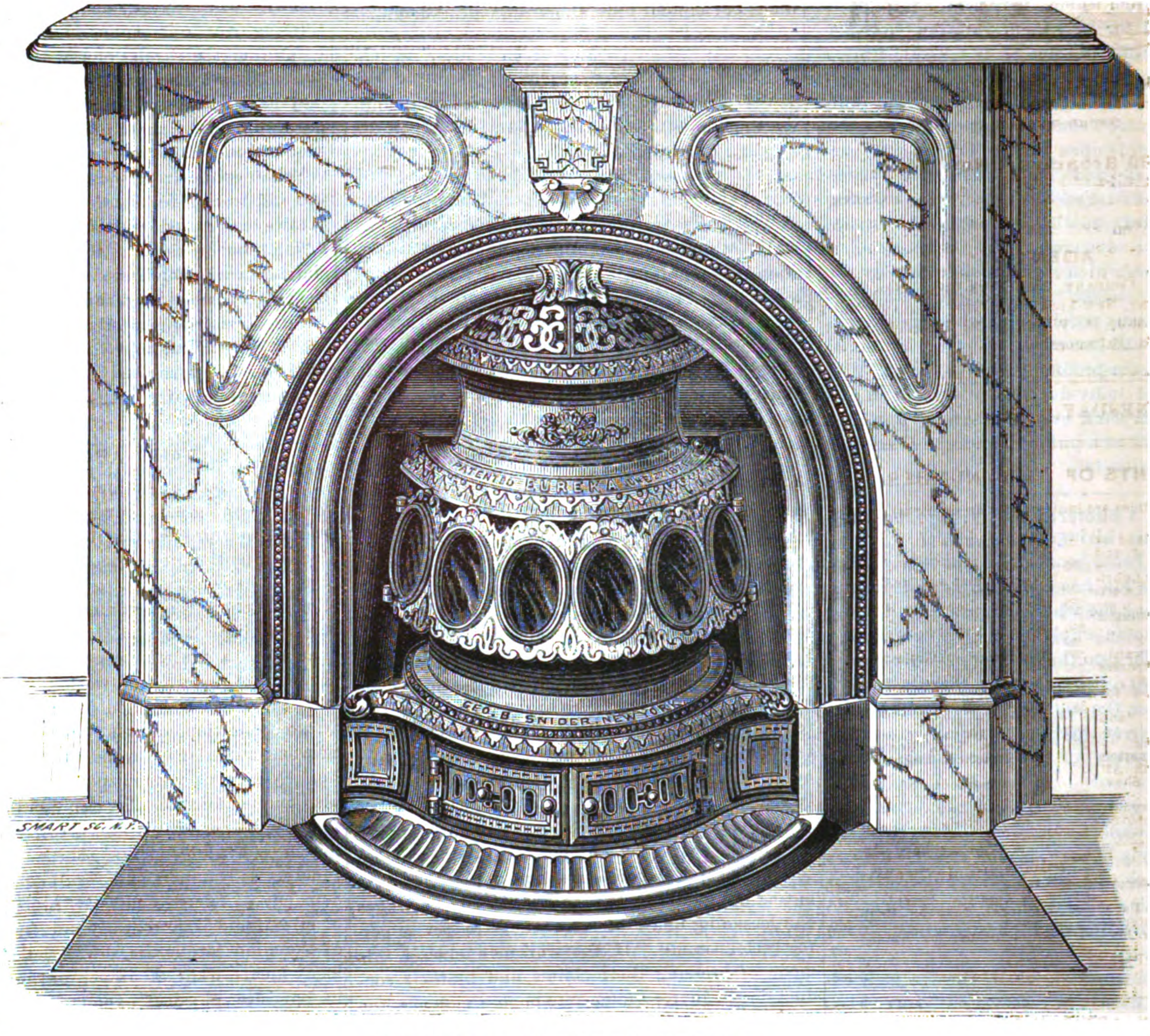
SMELTING iron in a cupola furnace, says the German correspondent of *Engineering*, appears to most people, who see it daily done at every foundry, the simplest thing in the world; it is, however, not so, if due regard is taken to economy and good quality in casting. In a common cylindrical cupola, three essential parts may be distinguished. The upper half or body of the furnace prepares the pig iron and lime which, together with coke, are thrown in at the top for smelting in the middle part or crucible, which is somewhat narrower, and provided with numerous nozzles for the introduction of blast, whence the molten iron, together with the slag, runs down to the lower part, or hearth, where it collects until it is tapped. When such a furnace is to be started, it is filled to about two-thirds with coke, and one-third with coke and iron; fire is then introduced, and the blast turned on, when the molten iron collects in the hearth and replaces the coke of the same. Here it necessarily takes up impurities from the coke, and impregnates the latter so much that it cannot be destroyed by the blast, and when the iron is tapped masses of coke and half melted iron, which are not any longer supported, tumble down in the hearth, where they are imperfectly burnt or melted, and cause the iron which collects there to become cold and sticky. These irregularities take place after every tap, and it generally happens that iron, which was at first fluid and gray, suddenly becomes thick and white, and unsuitable for the castings intended. In order to avoid this, Henry Krigar, of Berlin, constructs his cupola so that the lower part or hearth is not below the crucible, but by its side, and connected with it by a slanting canal, which is about three inches high, six to eight inches long, and as wide as the cupola. This arrangement prevents any coke or half melted iron from falling down in the hearth, which is only accessible to melted iron and slag, and forms for them a kind of sump or receiver, which in no way interferes with the regular working of the two upper parts of the cupola. This very simple construction has proved highly successful, and its great advantages are a saving of fuel, a uniformly hot and liquid iron, and an increased yield per diem, as the regular smelting operation is never interrupted. Krigar's cupola can, therefore, be recommended not only to foundries, but also to Bessemer works, and to such forges as use the Danks puddling furnace with liquid iron, as a uniform heat and quality of each charge are essential for their success.

Workingmen and the English Patent Laws.

AT a meeting of the Labor Representation League in England, Mr. R. Latham, the president, in the chair, the report just issued by the Select Parliamentary Committee on the Patent Laws was discussed. Much dissatisfaction was expressed with the report, and at the fact that members of the working classes had not been called to give evidence before the committee, the constitution of which body was objected to on the ground that its composition consisted two-thirds of manufacturers and parties representing interests antagonistic to those of inventors. It was also urged that a fair and complete inquiry into so important a subject as the patent laws could only be satisfactorily effected by a royal commission representing all the interests in the community, and steps were ordered to be taken with the view of insuring an exhaustive inquiry into the whole subject by that means. It was also agreed that a deputation should wait upon the Council of the Inventors' Institute in order to obtain their aid and co-operation in the matter; and the following resolution was carried unanimously:—"That the recommendations of the Select Committee of the House of Commons on the Patent Laws are by no means likely to benefit the most numerous class of inventors, namely, the artisans; and, if carried into effect, would render the obtaining of a patent more difficult, cumbersome, and expensive than at present. Moreover, the committee's recommendations do not provide what the generality of inventors stand mainly in need of, namely, an assimilation, as far as practicable, of the laws affecting invention-right to those of copyright, and especially increased facilities for the obtaining by inventors of a valid property in their own inventions at a reasonable cost, as is now advantageously done in Belgium, France, and other countries whose patent laws are in advance of those of this country." This looks as though the discussion of the English patent laws had not reached its conclusion.

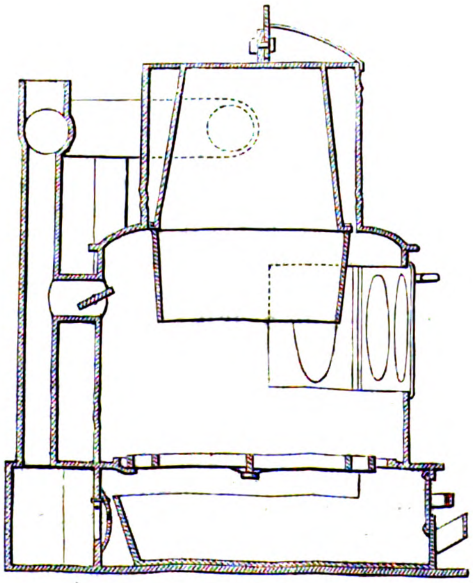
Snider's Improved Heater.

THE accompanying engravings illustrate an improvement in heaters for dwellings, patented through the "American Patent Agency," June 27, 1871, the construction of which is undoubtedly a marked improvement in this important fixture of the modern dwelling. The large engraving is a beautifully executed representation of the elegant exterior of this furnace, and the diagrams are respectively a vertical section and a plan view showing details of interior construction.



SNIDER'S IMPROVED HEATER.

These diagrams will give a general idea of the design, without dwelling up on the details with wearisome minuteness. One object attained is a very large radiating surface, through which the heat is communicated to the air used as the vehicle for conveying the heat to upper apartments in the usual way.



The heated gases first rise into an annular compartment surrounding the internal conical coal chamber above the fire-box; thence they pass into pipes which pass around backward toward the rear of the furnace, thence downward through vertical tubes or flues to the base, thence backward toward the rear of the furnace, and up through other vertical flues to horizontal tubes or flues, which lead to the final exit from the furnace and entrance to the chimney.

The arrangement of these parts is such that the furnace may be constructed cheaply, and made of a very tasty appearance, while facilities for admission of air and cleaning the passages are well secured.

Economy of fuel and easy control of the fire are also secured. The furnace is a base-burner, the conical chamber shown in the vertical section above the fire-box, receiving the coal which feeds down as wanted.

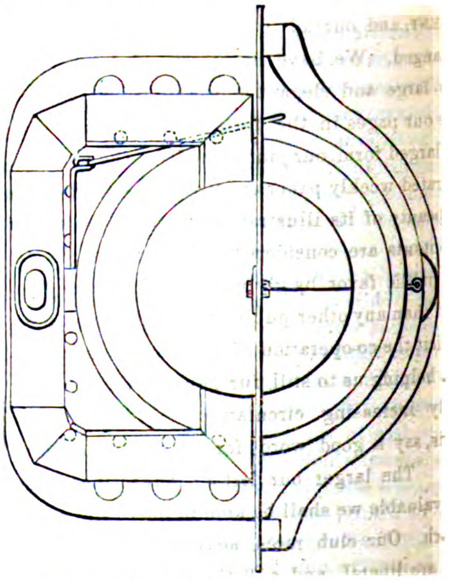
Thus is combined all the advantages of base-burning stoves with a heating furnace, an improvement which has been so successfully carried out in this heater that, when we consider its other advantages, we predict for it a large measure of popular favor. Further information may be obtained from the patentee and manufacturer, Mr. Geo. B. Snider, 1486 Third Avenue, New York.

IN eighteen months, four dealers in England have sold hydrate of chloral enough to put 36,000,000,000 people to sleep.

How to Dissolve Shellac in Ammonia.

MR. A. R. BROWN sends the following recipe to the *British Journal of Photography*:—Into any suitable vessel put the requisite quantity of shellac; place this in another larger vessel containing hot water. Pour upon the shellac boiling water—rather more than sufficient to cover it; now take liquor ammonia and pour in slowly but steadily, at the same time stirring with a stick or glass rod until the lac is dissolved. If too much ammonia be poured in, the solution will become very dark and be spoiled; if too little be used, the shellac will be insufficiently dissolved. The natural color of the shellac ought to be very much preserved. When cold, filter, and it is then ready for use. It keeps indefinitely.

A GENIUS walked into a foundry, and asked if they cast all kinds of things in iron. He was



answered "Yes." He then asked if they could cast a shadow. He was cast out.

BROWN & ALLEN, Publishers,

ISSUED WEEKLY AT

No. 189 Broadway, New York.

S. T. BROWN. L. ALLEN.

AGENTS.

AMERICAN NEWS COMPANY, New York City; NEW YORK NEWS COMPANY, New York City; NEW ENGLAND NEWS COMPANY, Boston; A. WINCH & Co., Philadelphia; H. TAYLOR & Co., Baltimore.

WEDNESDAY, JUNE 19, 1872

CONTENTS OF THIS NUMBER.

[Illustrations are indicated by an asterisk.]

THE AMERICAN ARTISAN TO BE ENLARGED.

PUBLISHERS' ANNOUNCEMENT.

AT the beginning of next volume the AMERICAN ARTISAN will be enlarged to a size considerably beyond its present proportions. THE SUBSCRIPTION PRICE WILL REMAIN THE SAME AS AT PRESENT, and our advertising rates will remain unchanged. We have in process of preparation many large and elegant engravings, which will grace our pages in the forthcoming volume. In its enlarged form, our journal will be the cheapest illustrated weekly paper ever published, when its size, beauty of its illustrations, and the value of its contents are considered. We propose to deserve public favor by giving more for money received than any other publication, and we earnestly solicit the co-operation of our friends and readers in helping us to still further extend our now rapidly increasing circulation. Old and new friends, say a good word for us as opportunity offers. The larger our list of subscribers, the more valuable we shall be able to make the paper for each. Our club rates, advertised on another page, are liberal, and a little effort will enable any one to send us a club.

CANADIAN PATENT LAW AMENDMENT.

WE have referred in recent issues of the AMERICAN ARTISAN to the bill before the Canadian Parliament providings, among other amendments to the patent law of the Dominion, for the granting of patents to residents of the United States. We have now the satisfaction of announcing that the bill has passed and become law, and will come into effect on the 1st of September next.

In a very few days, we shall have completed our arrangements for securing patents in Canada, and invite all persons who are desirous of obtaining them to communicate with us. We hope in our next issue to be able to give full information on the more important points of the law. At present, we will merely state that the total expense of a Canadian patent, including Government and our own and our Canadian agents' fees, will be very little if any more than the expense of obtaining an American patent. Models will be required in such cases as admit of models.

THE STRIKES.

As we predicted, the strikes among the various trades have assumed formidable proportions. There have, however, been few acts of violence, and it is evident that the leaders of the movement have the sagacity to adhere to the policy of persistence in their demands, with abstinence from lawless acts. This is a strong position which any overt act against persons or property would greatly weaken.

While, on general principles, we believe strikes are not the best means of permanently advancing the interests of labor, there is no doubt that as a means of obtaining temporary advance in wages and lessening hours of labor they are *per se* perfectly legitimate. If the workmen choose this mode of pressing their claims, and by their conduct do not invite violence to oppose violence, the result of this movement will depend solely upon the relative moral and material resources of the parties at issue. The weaker must yield in the end, and we hope these strikes will be so conducted as to demonstrate the relative strength of labor and capital in this country. The solution of the social problems of the time demands that this datum shall be furnished, and those who are most concerned in the progress of the human race are watching with intense interest for such light as may be evolved from the present contest.

As we write, a large demonstration is taking place in the form of a procession of workmen now moving through the streets of the city. No signs of yielding are evinced on the part of the strikers, and the employers apparently present an equally strong front. The effect is a complete prostration of many kinds of business. Mass meetings, trades-union councils, letters and addresses from employers, are the order of the day. Of the latter we may say that their tone is in general calculated to prevent irritation and allay the excited passions of the workmen.

Messrs. Brewster & Co., the celebrated carriage manufacturers, have issued an address to their workmen which is a fair sample of the kindly mode in which the employers meet the demands of the strikers. They deplore the fact that the pleasant relations heretofore existing between them have been broken off by the interference of persons whose interests, as they state, lie in the encouragement of discord. The men were asked to look backward, and see if there has been any violation of agreement on the part of the firm, and to consider whether they did not act unwisely in delivering over to irresponsible persons the right to determine their relations with their employers. The address closes with the hope that whatever may be the result of the strike, the workmen will do nothing that shall prevent the restoration of kindly relations between themselves and the firm.

Whatever destroys the friendly relations of capital and labor is to be deplored, as such a rupture is always attended with more or less loss and suffering; but these are the concomitants of any state of transition in society. Few other social issues have so agitated the world as has the labor question. Let us hope that its final settlement is drawing near, and that the strikes of May, 1872, are to be among the last to disturb the calm course of peaceful industry.

A TALK ABOUT TEA.

DR. ARLIDGE, an eminent physician of London, whose learning and powers of observation have been so well proved that his statements are entitled to attention, tells the tea-takers of the world that the habitual use of tea is the cause of many ills. He charges a vast amount of sickness among the working classes to this habit, and maintains that it is a fruitful cause of nervous debility throughout the civilized world.

That tea has a decided effect upon the nerves is without question, and that the habitual use of any nervous stimulant can be pursued by perfectly healthy persons without penalty, we believe to be also unquestionable. The only justification we can find for the use of any stimulant is a necessity begotten by hygienic errors. These errors are unfortunately so common, and result so much from the demands of our present civilization, that the use of stimulants is practically universal. Overwork of the mind, late hours, the anxieties of business, hasty meals, want of proper physical exercise, or its opposite, physical exhaustion, all combine to lower the general standard of health, and stimulants are sought to brace up the system against the extraordinary drafts made upon it.

Now, of all stimulants used for this purpose, we are thoroughly convinced tea and coffee are the best. They are free from the disagreeable odor imparted by alcohol and tobacco, they do not derange the digestive function as opium does, and only when used to great excess are their ill effects generally perceived. If, by a general reform in habits of living, the need for stimulants could be obviated, we should say, banish these with the rest. As it is, we have too often allayed a nervous headache and calmed tremulous nerves by a "good cup of tea," not to feel that, rightly used, this beverage is a boon to overtasked humanity.

THE RED SKINS.

THE "Big Indians," during their stay at the Grand Central Hotel, New York, elicited much remark, which for the most part was not very complimentary either to their beauty or their disposition. They are burly savages, who carry on their faces the imprint of the treacherous ferocity characteristic of their race. The oft-repeated romance of "the poor Indian, whose untutored mind," etc., is so quickly dispelled by one look at the cruel visages of these red-skinned rascals, that by revulsion of feeling most people feel like hanging rather than feasting them. Such at least was the general expression of feeling indulged in by the guests of

the "Grand Central" one evening when the redskins seemed more numerous than agreeable, and when we were there to see.

THE NEW YORK SOCIETY OF PRACTICAL ENGINEERING.

At the May meeting of the New York Society of Practical Engineering, the subjects discussed were type-composing machines and the steam-engine indicator. The paper upon the first-named subject was by Eugene Le Hardy de Beaulieu, the latter from Mr. Henry L. Brevoort. M. Beaulieu advocated the Delcambre machine, a French invention, in which the type are taken from the type-boxes, along inclined guides, by the action of gravity to the "stick." The "justification" is, as usual in machines of this kind, done by hand. The enormous sums paid annually by the daily papers in New York for composition—ranging from one to two hundred thousand dollars each—are sufficient to show the great importance of any machine which will effect a material saving in this department.

Mr. Brevoort characterized the indicator as a device by which the expert is enabled to gain an insight into the working of machinery, and by its aid apply both power and machinery to the best advantage. The utility of the indicator devised by Watt and applied to low-pressure engines was mentioned, together with the advantages from the first derived from its use. Its utter impracticability for the rates of speed now employed, sometimes amounting to one thousand feet per minute, rendered some other instrument for the purpose necessary. This is found in the Richards indicator, in which the motion of the piston and the length of the spring are both diminished by one-quarter. The non-user of the indicator frequently loses more through waste of coal arising from ignorance of the actual performance of the steam in the engine, than the cost of the indicator and the time and labor required in its frequent use. The use of the instrument is of the greatest value in adjusting valves with the requisite delicacy, since an engine may not unfrequently be in apparently the best working order when cold, yet under the influence of heat show decided defects of adjustment. Until a recent time, the instruments of foreign make have proved of better construction than those made in America. Manufacturers in this country have of late made decided improvements in the attachment of the spring, giving greater reliability under extreme pressure. In the former construction, the circular brass ends of the springs were applied in a slot cast all the way round, and after adjustment had been made they were fastened by pouring in melted white metal. Under considerable pressure one coil of the spring frequently rested upon another, injuring the action of the spring very much. The rem·dy for this is found in making two horizontal slots in the brass ends of the springs, and by means of them adjusting the spring so that it is supported at only two points, thus securing a uniform action of the spring under all pressures. Frequent tests of indicator springs are necessary even after they have been approved in practical trials, and these tests should be applied at the temperatures to which the springs are habitually subjected when testing engines.

The usual indicator piston is a cylinder closed at the top and open below. A recent modification in them is to bevel the lower edge from the inside outward, taking care not to make the thin edge so weak as to be unduly expanded on the admission of steam to the interior. This has been found to work very well. A suggested improvement is to prolong the tube of the piston above as well as below, in order to guard against a leakage from without inwards under a vacuum, as well as to resist higher pressures than those for which provision is commonly made. This form of piston in section would resemble an H. The piston-rod would be fastened by a ball-and-socket joint at the center, and the usual shallow grooves semi-circular in section turned upon the outside. The most convenient and efficient modes of taking cards, the value of reducing-wheels, and various adjuncts to the indicator which have been suggested, were taken up and considered by the writer with considerable minuteness.

Embarrassment of the Western Lumber Industry.

(From the Chicago *Railway Review*.)

Considerable apprehension and uneasiness have been felt by the lumbermen of Michigan and co interested capitalists in Chicago, lest by the unprecedented absence of spring rains and the consequent prevalence of fires in the woods and low water in the streams, the customary and needed supply might not be manufactured this year. Dispatches mention a meeting held at Greenville, Mich., on the 28th, comprising representatives of the lumber interests of Grand Haven, Grand Rapids, Muskegon, and other places on Flat River, and of Chicago lumber yards, to devise means to facilitate the running of logs down that stream. Nothing definite was accomplished, however, and we hazard little in the prediction that but little can be accomplished without the aid of a higher power to swell their rivers at just the right juncture, or of an artificial power which shall build railways up the banks of those fickle reliances, rendering lumbermen independent of them. It is well authenticated that, as a new country is improved and its forests cut away, the streams diminish in volume, and long seasons of drought interfere with every operation depending upon water supply. In the Eastern States, many mills on the margins of what were once large rivers are supplemented by steam-engines to supply necessary power in the summer months. This, we doubt little, must become the condition of many manufacturing towns in the West; and especially where water is relied upon to float rafts of logs as well as to move machinery to turn out lumber.

Dispatches of the 1st inst. from Muskegon and White River region are, however, more encouraging. They state that, although the dryness of the season had never been equaled, that section had escaped damage by fire, and that then recent abundant rains had dispelled all fears from that source; and that "there will be more lumber cut this year than ever before if they have the usual June heavy freshets, for with the rains had already, aided by a small flood this month, a much larger per cent. of logs will reach the mills than was anticipated six weeks ago. The quantity of logs put in last winter was over 500,000,000 feet in Muskegon and White Rivers, with their tributaries alone—about 200,000,000 feet more than last season. The drive on those streams progresses slowly, and we fear that rather less than 120,000,000 will be "hung up." Logs are costing a little more than usual to drive, but will not average much higher. Mills are cutting all their capacity will allow, and, as far as Muskegon County is concerned, the prospect for a *profitable* season is good.

Practical Recipes.

Furniture Oil.—Take four ounces of bruised alkanet-root and one gallon of linseed oil; boil together in a glazed pipkin until the color is extracted from the alkanet; cool and strain for use.

Blue Ink.—Oxalic acid, one dram; distilled water, six drams; best Prussian blue, six drams; rub the latter with the solution of acid to a thick paste, and add two ounces of pulverized gum arabic, and one quart of soft water. Let it stand to settle for twenty-four hours, and pour off the clear portion for use.

To Remove Fruit or Acid Stains from Carpets.—Dissolve one ounce of carbonate of ammonia in one quart of warm rain water, and carefully apply to the stains with a sponge.

To Wash Silk.—Half a pint of gin, four ounces of soft soap, and two ounces of honey, well shaken. Wet a sponge with the mixture, and rub the silk, which should be spread upon the table. Then wash it through two waters, in which put two or three spoonfuls of ox-gall, which will brighten the colors and prevent them running. Do not wring the silk, but hang it up to dry, and while damp iron it. The lady who furnishes this receipt says she has washed a green silk dress by it, and it looks as good as new.

Brass.

Zinc and copper form brass. With a very small quantity of zinc, copper is rendered of a paler red, and it gradually passes to yellow as the quantity is increased, becoming brightest when the metals are in equal proportions. The best brass is formed by union of 2 equivalents of copper to 1 of zinc, or 64 parts of the former to about 36 of the latter. Brass of 75 parts of copper to 25 zinc fuses at 1,750°, and the larger the amount of zinc the more fusible the product. A small quantity of lead in brass will injure its wire-drawing qualities; but about 2 per cent. much improves its working in the lathe by diminishing its toughness. A little tin increases its hardness. When the zinc is in excess, the brass becomes very brittle, and the most brittle kind is that composed of 2 equivalents of zinc with 1 of copper. Ordinary malleable brass is also rendered brittle by heating or annealing, and old brass wire will at times become perfectly brittle from having assumed quite a crystalline state internally. Brass may be much hardened and condensed under the hammer. Two parts of brass to one part of zinc form the best solder for brass. Silver solder is an alloy of brass and silver. The best formula for it is, silver, 65; copper, 24; and zinc, 11 parts.

What is known as mosaic gold is actually a good form of brass; it is made by fusing equal weights of copper and zinc, and then adding zinc by degrees, until, passing through various tints of yellow, red, and purple, the fused alloy is quite white; this assumes the color of fine gold upon cooling, and preserves an unoxydized bright surface.

The alloys known as nickel silver, or German silver, are formed of copper with nickel and zinc. A very good quality is made, according to Miller, by 51 parts of copper, with 30·6 zinc and 18·4 nickel; this is in the ratio of cu. 5, zn. 3, and ni. 2 equivalents. But the best form is 55 parts copper, 21 of nickel, and 54 of zinc; this gives a very silvery metal. Where, however, it is intended for electro-plating, for which it is now very extensively manufactured, the proportion of nickel may be diminished. In forming German silver the copper and nickel must be first melted, and then

the zinc added to prevent oxydation of the latter. The alloy has a crystalline structure, and before rolling it must be well annealed, so as to overcome this as completely as possible.

Much Truth in Small Compass.

THE following advice to advertisers is from the *American Press*, a paper published by Walter T. Dwight & Co., of Detroit, advertising agents in the interest of advertisers:—What the honest advertiser wants, and, indeed, what every advertiser in the land wants, is the greatest return for the amount of money invested. In order to do this, there is but one reliable method, and that is the newspaper. The American people are pre-eminently a reading people, and of all the literature thrown broadcast over the country, that of the newspaper predominates and is the most generally read. The people are gradually being educated up to the practice of looking into the advertising columns of the newspaper in order to find where their wants can be supplied. This being the fact, it is patent to every sensible advertiser that the place to display his wares is where they will be the most likely to be seen, which is the newspaper. Further than this, the newspaper is far less indestructible as an advertising medium than any other medium that can be devised, which of itself is an important matter, and which is not the case with any other modes that have been devised from time to time. In conclusion, then, it is presumed that the advertiser always wishes to receive a fair return for his investment when he advertises. To do this he must seek the most reliable medium; that medium is most emphatically the newspaper; and the wise and judicious advertiser will always reject every other medium.

A weekly paper has great advantages for advertisers over a daily. It generally lies on the table, ready to be perused by one and another for a week, and often for several weeks at a time. Each copy also is read by a greater number of persons, often being loaned from family to family. Besides, the number of advertisements being limited, and generally of an interesting character, the chances of each one being read are much greater than in a daily. A weekly also reaches all classes in all sections of the Union, who can scarcely be reached in any other way, as they do not take other papers. These facts will be evident to any one who reflects upon the subject.

NEW BOOKS AND PUBLICATIONS.

A POCKET DICTIONARY OF TECHNICAL TERMS USED IN ARTS AND MANUFACTURES. Abridged from the Technological Dictionary of Rumpf, Mothes, and Unverzagt. With the addition of Commercial Terms. First Part, German, English, French. Second Part, English, German, French. Third Part, French, German, English. 3 vols. 12mo, paper. L. W. Schmidt, 24 Barclay Street, New York. C. W. Kreidels, Verlag Wiesbaden.

A good technological dictionary is a desideratum, and, although we have never seen one that fully met our views of what such a work should be, this publication perhaps approaches our ideal as nearly as we could expect, when we consider the difficulty of preparing a satisfactory compilation of this kind. No one unfamiliar with the great variety of technical terms, local and general, applied to designate the same thing by those speaking the same language, can form the least idea of the labor attending the collection, classification, and definition of them in a work designed to be as nearly as possible complete. The original work of which this is an abridgment is perhaps as complete a collection of technical terms as was ever published, and in the abridgment, a task requiring great judgment, there has been very little omitted that could not well be spared without lessening the value of the compilation as a practical work of reference. All writers on technical subjects, and translators of scientific and industrial publications, will find this pocket dictionary an invaluable help. The three volumes are sold at the low price of $3 25 for the set.

HALF-HOUR RECREATIONS IN POPULAR SCIENCE. No. 3. Spectrum Analysis explained. Illustrating its Uses to Science, and including the Theory of Sound, Heat, Light, and Color. By Professors Schellen, Roscoe, and Higgins. Boston: Lee & Shepard; New York: Lee, Shepard & Dillingham.

Perhaps some of our readers will need to be informed that the series of *Half-hour Recreations in Popular Science* is a monthly publication, the yearly subscription price of which is $2 50. The price of single numbers is 25 cents. Of its kind, no finer series of publications has been issued by any American publisher. The present number is one of the finest of the series, and is embellished by beautiful colored plates of various spectra. The subject of Spectrum Analysis is fully explained and its mysteries laid bare so that all may read understandingly. Twenty-five cents cannot be better invested than in the purchase of this number.

CHARLES O'MALLEY, THE IRISH DRAGOON. By Charles Lever. Price seventy-five cents.

This is the first volume of a new, cheap, and popular edition of the celebrated works of the late Charles Lever, to be published at once by T. B. Peterson & Brothers, Philadelphia, which will have a very large sale, for Charles Lever never had a rival or equal in that free, manly, dashing style of sketching life, manners, and humorous incidents to which he devoted himself. The novel is issued in a large octavo volume, with a portrait of the author on the cover, price seventy-five cents, and is for sale by all booksellers, or copies will be sent to any place, post-paid, by the publishers, on receipt of price by them.

THE FATAL MARRIAGES. By Henry Cockton. Price seventy-five cents.

This is the first of a new, cheap, and popular edition of the works of Henry Cockton, now in course of publication by T. B. Peterson & Brothers, Philadelphia, Pa. It has created a great sensation in London, and doubtless will be as popular here. "The Fatal Marriages" is issued in a large octavo volume, with portrait of author on the cover, price seventy-five cents, and is for sale by all booksellers, or copies will be sent, post-paid, by the publishers on receipt of price.

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NEW AMERICAN PATENTS.

UNDER this head we shall give a weekly summary of the more important American and English Patents.

CHILD'S CARRIAGE.—G. L. Atwater, asgr. to the New Haven Folding Chair Co, New Haven, Conn.—*June* 4.—The frame of this carriage is directly connected with the forward axle, and by springs with the rear axle, and in such a relative position to the wheels that the body, which is pivoted to the frame, may be reversed and not come in contact with the wheels. Push handles are connected with the frame. The pivoted body rotates in reversing, on a turn-table or circle, and is secured in either of its two positions by a slide-bolt. The carriage can thus be drawn or pushed, the face of the occupant being always in the direction of the advance of the carriage.

CANAL-BOAT.—N. H. Murray, Louisville, Ky.—*June* 4.—This invention consists in a system of pipes opening at the bottom and bow of the boat, and also pipes opening at the bow and sides of the boat, used in connection with a chamber, with which the latter pipes communicate, and through which water is forced to propel the boat.

MANUFACTURE OF COLORING MATTER FROM ANTHRACENE.—W. H. Perkin, Sudbury, England.—*June* 4.—Chlorinated or brominated anthracene, or partly chlorinated and partly brominated anthracene, is treated with sulphuric acid, which process is claimed to produce a coloring matter suitable for dyeing and printing purposes.

WASHSTAND WATER SUPPLY AND WASTE ARRANGEMENT.—H. J. Ruthrauff, Warrensburg, Mo.—*June* 4.—A wash-stand is made to bear removable reservoirs, vertically arranged for clean and waste water, a pump and pipe for forcing the clean water into the basin, and a spout leading therefrom to the waste water reservoir, combined and arranged in a peculiar and novel manner.

MACHINE FOR TWISTING METAL.—T. Smith, Green Island, N. Y.—*June* 4.—This is a combination of molding rolls, each in form approximating a sphere, with a device for grasping the end of the plate, and mechanism to rotate the grasping device, while at the same time it receives rectilinear motion, the velocities of the movements regulating the amount of twist to be given to the plate. The whole forms a very ingenious and useful invention.

PURIFYING SACCHARINE JUICES.—T. E. O. Allaire, Paris, France.—*June* 4—The prominent feature of this invention consists in the use of hydrofluosilicate of ammonia, or the double fluoride of silicium and ammonium, or other double fluoride containing silicium. The double fluoride is used with cream of lime, or the equivalents of these substances are used together to form an insoluble instead of a soluble fluoride. The precipitates of the first operation are utilized so as to recover the double fluoride. A peculiar apparatus is employed for preparing fluoride of silicium or the hydrofluosilicic acid, which apparatus is covered by the fifth claim. As our readers acquainted with sugar-refining will perceive, this is, in a chemical point of view, a very interesting process, the importance of which, however, remains to be demonstrated.

SPOOLING SILK.—H. L. Brown, Middletown, Conn.—*June* 4.—This is a mode of determining the weight of thread or silk, wound upon a commercial spool, while winding from a bobbin on a balanced beam or scale, with a counterbalance adjusted to the weight of the bobbin, minus the weight of silk to be transferred to the commercial spool. The method of completing the exterior smooth coil simultaneously with the delivery of the complement of weight, by having the scale adjusted to rise just before the beginning of the last coil necessary to complete the weight, and running said coil on afterward, is also claimed.

SPRING LINK FOR WIRE RIGGING.—J. E. Liardet, Middlesex, England.—*June* 4.—This is a combination of a double-headed cradle with two series of springs with pistons and piston-rods, in the construction of spring links to be used in connection with cables, ropes, or chains for moving, towing, and the rigging of ships, to secure the cables, etc., from breaking under sudden strains.

TOP FOR HEATING-STOVES.—H. Whittingham, New York City.—*June* 4.—This is a top for heating stoves formed of sheet metal by spinning. It is patented as a new article of manufacture.

CURTAIN FIXTURE.—D. G. Chase, Boston, Mass.—*June* 4.—A cylindrical friction spring affords the requisite friction to prevent the curtain from running down, while at the same time it gives a bearing for the roller to turn upon, and furnishes a support at its outer end for the roller upon its bracket. The spring cannot turn with the roller.

MANUFACTURE OF BIRD-CAGES.—G. Günther, New York City.—*June* 4.—In this bird-cage the cross bands are connected with the upright wires by compressing the metal of the cross bands, and forming ribs to surround the said upright wires.

IMPROVEMENT IN POLE CHANGERS.—J. E. Smith, New York City.—*June* 11.—This invention consists in a pole changer or current reverser of simple construction, composed mainly of a single metallic or other suitable wheel, a couple of springs, and two adjustable screws or points of electrical contact, the whole being arranged so that the pole changer is made to operate by two rubbing and two direct pressure electrical connections.

IMPROVEMENT IN NAVIGABLE VESSELS.—B. T. Babbitt, New York City.—*June* 11.—This invention relates to vessels which are propelled by means of a pump or other device, arranged to admit water at the bow and eject it along a trunk from the stern or opposite end of the boat, below the level of the surrounding water, or to eject it from either side of the vessel, for the purpose of steering the same. The invention consists in a socketed construction of the water trunk hereinbefore named, at its end or ends, whereby a train of vessels or series of vessel sections arranged end to end may be provided with a continuous passage for the water drawn in at one end of the train and ejected at the other end thereof, to effect propulsion of the entire train by a pump or pumps at the one end of the latter.

SPRING ROCKING-CHAIR.—P. C. Ingersoll, Green Point, N. Y.—*June* 11.—This invention relates to that class of chairs whose seat and back rock on a stationary base or pedestal under the control of a spring. It consists in a novel construction and arrangement of the spring and combination with the seat and the stationary base, pedestal, or support of the chair, whereby great efficiency and durability are obtained.

FAUCET.—N. Holtz, Brooklyn, N. Y.—*June* 11.—This invention consists in a novel construction and combination of the operating portions of a faucet, or certain of them, whereby leakage is effectually prevented, and increased durability is insured, with great facility of repair, and the valve, which is self-closing, may have its pressure against the seat regulated to the pressure of the fluid the faucet is used to draw off; also, the faucet may be locked in an open position for any given discharge as required.

IMPROVEMENT IN MANUFACTURE OF SOAP.—B. T. Babbitt, New York City.—*June* 11.—This invention relates to the manufacture of soap under heat and pressure, and consists in a novel process of boiling soap by means of an apparatus composed of a close vessel, in which the oils or fatty matters and lye to produce saponification are inserted by a suitable inlet at or near its top, a perforated steam distributer arranged within said vessel at or near its bottom, for the introduction of simple or superheated steam direct among the ingredients, for the

purpose of heating and agitating the mass, and a lower pipe or outlet for discharging the contents of the vessel, and which may be done under pressure.

IMPROVEMENT IN PRINTING PRESSES.—E. A. Warren, New York City.—*June* 11.—This invention—or certain features of it—is more particularly designed to be applied to printing presses for printing book-heads and other like work, although not exclusively restricted thereto. The improvements consist in the employment of certain top-guides disconnected from the beds, but adjustable in or out relatively to the latter, and towards or from each other, for directing and arresting the feed of the strip or sheet to be printed as in printing books or bill-heads, said guides being dispensed with when printing a continuous sheet. The improvement also consists in novel means for alternately steadying and setting in motion a revolving inking plate, the same being steadied by the travel of the inking-roller across its entire face, and being set in motion by the action of a weight as the inking-roller leaves it. There are also novel means for hanging and operating the inking-roller, said means including a combination of springs, racks, and pinions, whereby the inking roller is made to have a uniform action over the inking-plate.

IMPROVEMENT IN THE BOILING OF SOAP UNDER PRESSURE.—B. T. Babbitt, New York City.—*June* 11.—In making soap from certain oils or fatty matters in a closed vessel under heat and pressure, it is very advantageous, and, when using certain lyes, necessary to keep up an agitation of the ingredients in the vessel, for the purpose of producing a proper mixing of the ingredients to effect saponification of the fatty matter with the alkali. Stirrers or machinery arranged within the closed vessel for accomplishing the same fail to effect the thorough agitation that is necessary, and are an obstruction within the vessel, which is objectionable. The invention consists in a process of making soap under pressure, in which two elements, to effect a perfect success, are employed namely, first, the heating of the mass in the closed vessel by steam of a high temperature but low pressure, that is to say, by superheated steam, preferably of about 100 pounds pressure and 360 degrees temperature or thereabouts; and secondly, by maintaining a perfect agitation of the whole body of the heated mass by means of a pump on the outside of the vessel, and connecting with the latter above and below for the purpose of keeping up a circulation and thorough agitation within the vessel.

OFFICIAL LIST OF PATENTS

ISSUED FROM THE UNITED STATES PATENT OFFICE

For the Week ending June 11, 1872.

AND EACH BEARING THAT DATE.

[Reported officially for the "American Artisan."]

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Address BROWN & ALLEN, *Solicitors of American and Foreign Patents, 189 Broadway, New York.*

127,671.—EXCAVATING MACHINE.—S. Achenbach, Orangeville, Pa.
127,672.—CAR-SPRING.—J. Anderson, New York City.
127,673.—FLOUR-BOLT FEEDER.—J. Boehm, Peru, Ohio.
127,674.—CULTIVATOR.—G. Bradley, Rockford, Ill. Ante-dated June 5, 1872.
127,675.—SEWING-MACHINE.—E. Braundbeck, assgr. to T. H. Menke, Hamburgh, Germany.
127,676.—POTATO-DIGGER.—D. T. D. Brown, Mumford, N. Y.
127,677.—DISK FOR AGRICULTURAL IMPLEMENTS.—E. T. Bussell, assgr. to W. M. Bussell, Indianapolis, Ind. Ante-dated May 25, 1872.
127,678.—PADLOCK.—G. L. Chamberlin, Marietta, Ohio.
127,679.—SCALDING APPARATUS.—F. G. Chesman, Du Page, Ill.
127,680.—GRAIN-CLEANER.—J. H. De Force, Healdsburg, Cal. Ante-dated June 7, 1872.
127,681.—FILTER.—F. J. Delker, Philadelphia, Pa.
127,682.—MECHANISM FOR PRODUCING ROTARY MOTION.—C. E. De Lorière, London, England.
127,683.—BREECH-LOADING FIREARM.—W. C. Dodge and P. T. Dodge, Washington, D. C., assgrs. to E. Remington & Sons, Ilion, N. Y.
127,684.—STOVE-GRATE.—W. Doyle, Albany, N. Y.
127,685.—STREET-LAMP.—J. S. Fish, Cleveland, Ohio.
127,686.—DIVIDER.—H. Gerecke, Carlstadt, N. J.
127,687.—LAND-ROLLER.—J. F. Glidden, De Kalb, Ill
127,688.—ORE-WASHER.—L. M. Gochnauer, Marietta, Pa. Ante-dated June 1, 1872.
127,689.—DIFFERENTIAL PULLEY-BLOCK.—C. Hall, New York City.
127,690.—GRIPING-PULLEY.—A. S. Hallidie, San Francisco, Cal.
127,691.—STRETCHING AND DRYING CLOTHS.—P. Hild, deceased (Catharine Hild, administratrix), New York City.
127,692.—APPARATUS FOR SIZING, STRETCHING, AND COLORING PAPER AND OTHER FABRICS.—P. Hild, deceased (Catharine Hild, administratrix), New York City.
127,693.—BED LOUNGE.—C. H. Hildreth, Chicago, Ill.
127,694.—BEDSTEAD FASTENING.—S. Jones, San Francisco, Cal. Ante-dated May 23, 1872.
127,695.—PADLOCK.—B. Kensler, assgr. to J. L. Howard & Co., Hartford, Conn.
127,696.—HAND CORN-PLANTER.—H. Lage, Omaha City, Neb.
127,697.—SAWING MACHINE.—W. W. Le Grand, assgr. to J. S. Ridley and J. H. Lowery, Elkton, Ky.
127,698.—INCASED WASHSTAND.—E. E. B. Low, New Brighton, N. Y.
127,699.—BLOCKS FOR PAVEMENTS FROM FURNACE SLAG.—F. A. Luckenbach, New York City.
127,700.—SWITCH-STAND.—W. L. Meeker and F. Kearney, Newark, N. J.
127,701.—ANIMAL-TRAP.—L. Meyer, St. Louis, Mo.
127,702.—REVOLVING SUPPORT FOR PRINTING BOOT-TOPS.—A. P. Nash, Weymouth, Mass.
127,703.—COAL-SIFTER.—L. T. Newell, Geneva, Ohio.
127,704.—WIND-WHEEL AND GEARING.—G. S. Oberdorff, Lower Windsor, Pa.
127,705.—PHOTOGRAPH MOUNT.—A. C. Partridge, Boston, Mass. Ante-dated June 1, 1872.
127,706.—COMBINATION LOCK.—G. H. Peacock, Webster, N. Y.
127,707.—FOLDING DOUBLE STEP FOR CARRIAGES.—J. Pendergast, New Haven, Conn. Ante-dated May 22, 1872.
127,708.—BLACKSMITH'S BUTTERIS.—J. H. Rhamy, Findley, Ohio.
127,709.—WASHING MACHINE.—L. S. Riggs and A. B. Parsons, Highland, Kan.
127,710.—WELL-BORING MACHINE.—J. F. Rupp, Archbold, Ohio.
127,711.—VAPOR-BURNER.—S. Rust, Jun., assgr. of one-half his right to S. Williamson, Cincinnati, Ohio.
127,712.—ROCK-DRILLING MACHINE.—A. J. Severance, San Francisco, Cal.
127,713.—TRANSPLANTER.—B. Shirley, Kelloggsville, N. Y.
127,714.—RELIEF APPARATUS FOR ROLLING MILLS.—J. Sullivan, Boston, Mass.
127,715.—BUGGY-TOP.—W. Tanner and W. Shimanaur, Findley, Ohio.
127,716.—MACHINE FOR CUTTING LEATHER FLY-NETTING.—T. Tully, Springfield, Ill.
127,717.—WIND-WHEEL.—W. I. Tustin, San Francisco, Cal.
127,718.—OVEN-DOOR OF COOKING-STOVES.—S. S. Utter, Brooklyn, N. Y.
127,719.—MEDICAL COMPOUND FOR TREATING PILES.—J. W. Ward, Lowell, Ohio.
127,720.—DINING-TABLE.—B. Welteck, New York City.
127,721.—TRAP.—J. H. Welty and G. Hollinger, Mount Carroll, Ill.
127,722.—CASE FOR RIBBONS, VELVETS, ETC.—S. Whitaker, Macon, and A. Ruth, Decatur, Ill.
127,723.—APPARATUS FOR VAPORIZING AND BURNING HYDROCARBONS.—S. J. Whiting, Philadelphia, Pa.
127,724.—STEAM-GENERATOR.—I. N. Wilfong, Philadelphia, Pa.
127,725.—ATTACHMENT FOR WHIFFLETREES.—J. T. Williams, San Francisco, Cal.
127,726.—HOISTING APPARATUS.—W. C. Williamson, Philadelphia, Pa.
127,727.—MIDDLINGS SEPARATOR.—E. Yeagly, West Earl, Pa.
127,728.—MITERING ATTACHMENT FOR SAWING MACHINES.—A. Aitken, East Corinth, Vt.
127,729.—POWER-INDICATOR FOR STEAM-ENGINES.—W. Ashton and J. H. Storey, Manchester, Kingdom of Great Britain.
127,730.—MOWING MACHINE.—B. Atwood, Stanstead, Canada.
127,731.—MACHINE FOR SIZING, STRETCHING, AND DRYING CLOTH.—W. Bailey, assgr. of one-half his right to G. B. Sloan, Oswego, N. Y.
127,732.—HEMMER FOR SEWING-MACHINES.—D. Barnum, Brooklyn, N. Y.
127,733.—COVERING TUBULAR FABRICS WITH RUBBER.—W. H. Bates and H. Faulkner, Leicester, England, assgrs. to E. T. Sawyer, East Hampton, Mass.
127,734.—PLOW-WHEEL.—L. C. Bristol, Holly, Mich.
127,735.—PRUNING-SHEARS.—P. Broadbooks, assgr. of one-half his right to R. F. Thompson, Batavia, N. Y.
127,736.—METAL-CLAD WOODEN BLIND.—W. E. Brock, New York City.
127,737.—BREECH-LOADING FIREARM.—A. Burgess, Owego, N. Y.
127,738.—MOLD FOR CASTING AND CHILLING SLEIGH-SHOES.—V. A. Butman, Ironton, assgr. to himself and V. L. Benjamin, Fond du Lac, Wis.
127,739.—TYPE-WRITING MACHINE.—E. Cadmus, Washington, D. C.
127,740.—CASTER-BOTTLE.—C. Casper, assgr. to the Meriden Silver Plate Co., West Meriden, Conn.
127,741.—BED-LOUNGE.—H. Closterman, Cincinnati, Ohio.
127,742.—BUTTER TUB AND COOLER.—A. J. Connelley and T. Benjamin, Philadelphia, Pa.
127,743.—BROOM AND BRUSH HOLDER.—G. B. Cunningham, Northampton, Mass. Ante-dated June 4, 1872.
127,744.—STONE-TRUCK.—G. A. Davidson, Malden, assgr. to himself and H. T. Caswell, Troy, N. Y.
127,745.—WATER-ELEVATOR.—E. Deaver, Rokeby, Ohio.
127,746.—ROTARY CULTIVATOR.—M. Decelle, Newburg, Ohio.
127,747.—APPARATUS FOR OPERATING STEAM-ENGINES.—J. Donnelly, assgr. of one-half his right to H. R. Peck, Hudson, N. Y.
127,748.—SPINNING MACHINE.—G. Draper, Hopedale, Mass.
127,749.—FENCE-POST.—H. N. Dunbar, Mentor, Ohio.
127,750.—PANTALOON GARMENT.—G. R. Eager, Boston, Mass.
127,751.—CLOTHES-PIN.—R. Emerson, Rockford, Ill.
127,752.—BAROMETER.—A. H. Emery, New York City, and J. Johnson, Saco, Maine.
127,753.—STEM WINDING AND SETTING WATCH.—E. C. Fitch, assgr. to Robbins & Appleton, New York City.
127,754.—LAMP-CHIMNEY CLEANER.—A. A. Ford, North Abington, Mass.
127,755.—MANUFACTURE OF TUBING.—J. B. Forsyth, Boston, Mass.
127,756.—LEATHER-SLICKER.—G. B. Fowle, Boston, Mass.
127,757.—CULTIVATOR.—A. Friberg, Moline, Ill.
127,758.—SAW-SET.—J. Garman, Ebensburg, Pa.
127,759.—RAILWAY-SWITCH.—W. W. Gelatt, Keokuk, Iowa.
127,760.—MECHANISM FOR DISENGAGING HORSES FROM WHIFFLETREES.—J. B. Goldsmith, Rockport, Mass.
127,761.—COMBINED SIDEBOARD AND EXTENSION TABLE.—N. B. Goodnow, Watertown, and S. W. French, Boston, Mass.
127,762.—ICE-BOX FOR REFRIGERATORS.—J. Gravenstine, Philadelphia, Pa.
127,763.—HORSE-POWER.—W. G. Halbert, Columbus, Miss.
127,764.—CIGAR-MOLD.—B. Hawkins, Trenton, N. J.
127,765.—SEWING-MACHINE.—W. Heidenthal, assgr. of one-half his right to W. S. Carpenter, Port Jervis, N. Y.
127,766.—APPARATUS FOR MOVING BUILDINGS.—W. N. Hemenway, Pecatonica, Ill.
127,767.—CARRIAGE RUNNING-GEAR.—W. Hemme, Michigan Valley, Kan.
127,768.—STOP-VALVE FOR WATER-PIPES.—J. L. Hewes, Newark, N. J.
127,769.—HOG-TRAP.—H. W. Hill, Forsythe, Ill.
127,770.—FIRE-EXTINGUISHER.—C. T. Holloway, Baltimore, Md.
127,771.—WIND-WHEEL.—J. J. Hosey, Cape Girardeau, Mo.
127,772.—BURNISHING MACHINE FOR BOOTS AND SHOES.—J. H. Howard, assgr. to himself and J. W. Chamberlin, Stoneham, Mass.
127,773.—KNOB-LATCH.—C. M. Jordan, Stillwater, Minn.
127,774.—MILL-PICK.—F. Kortick, Mendota, Ill.
127,775.—RAILWAY GATE.—G. A. Kristle and S. Horn, Fort Seneca, Ohio.
127,776.—SHUTTLE-BINDER-ACTUATING MECHANISM.—H. H. Law, Gloucester, N. Y.
127,777.—GUIDE FOR SCISSORS.—W. H. S. Lawrence, Bangor, Maine.
127,778.—WARDROBE-BUREAU.—J. H. F. Lehmann, New York City.
127,779.—BOOT AND SHOE NAILING MACHINE.—W. N. Linnell, Cambridge, assgr. to G. McKay, trustee of the McKee Sewing machine Association, Boston, Mass.
127,780.—CARRIAGE-CURTAIN FASTENER.—T. D. Marsh, Jersey, Ohio.
127,781.—AWNING.—W. Matthews, Orange, N. J.
127,782.—METALLIC BOX.—I. C. Mayo, Gloucester, Mass.
127,783.—COMBINED BUTTON-HOLE CUTTER, EYELET-PUNCH, AND SCISSORS-SHARPENER.—W. C. McGill, Cincinnati, Ohio.
127,784.—JOURNAL-BOX.—G. R. Meneely, West Troy, N. Y.
127,785.—CULTIVATOR.—A. Merrill, Ingersoll, Canada.
127,786.—BEDSTEAD FASTENING.—T. W. Moore, New York City, assgr. to F. N. Moore, Plainfield, N. J.
127,787.—CASTING WATER-TRAPS.—P. Naylor, New York City.
127,788.—GRAIN-SEPARATOR.—M. T. Nesbitt, Colora, Md.
127,789.—HOISTING APPARATUS.—D. A. Noble, Boston, Mass.
127,790.—CAR-COUPLING.—S. G. Northrop, Wilmington, N. C.
127,791.—BRIDGE.—R. L. Partridge, Marysville, Ohio.
127,792.—IRONING-TABLE.—J. T. Plowman, Sen., Baltimore, Md.
127,793.—SCREW-CUTTING DIE.—S. W. Putnam, Jr., Fitchburg, Mass.
127,794.—CLASP FOR SECURING THE COVERS TO MILK AND OTHER CANS.—G. D. C. Ransom and C. Smith, Brooklyn, N. Y.
127,795.—STOVE-GRATE.—S. H. Ransom and B. Burton, Albany, N. Y.
127,796.—PROJECTILE.—J. Rigney, West Point, N. Y.
127,797.—DISTILLING FRESH FROM SALT WATER.—A. M. Ring, St. John, New Brunswick.
127,798.—SELF-SUSTAINING GAS-BRACKET, LAMP-STAND, ETC.—C. Robb, Montreal, Canada.
127,799.—FLY-WHEEL FOR SEWING-MACHINES.—G. Roberts, Lowell, Mass.
127,800.—ANIMAL POWER.—H. Rosamyer, Jun., Alleghany City, Pa.
127,801.—CORN-HUSKING MACHINE.—J. Russell, New York City, assgr. to J. Chace and J. Dunning, Brooklyn, N. Y.
127,802.—APPARATUS FOR PURIFYING MILK.—J. M. Schermerhorn, North Gage, and S. Perry, Newport, N. Y.
127,803.—FIREPROOF SHUTTERS.—F. Schumann, assgr. to himself and A. B. Mullett, Washington, D. C.
127,804.—FILLING WOOD TO BE VARNISHED.—F. Seabury, assgr. to himself, J. S. Seabury, A. D. Seabury, A. Grant, and N. Grant, Yarmouth, Maine.
127,805.—COAL-SIFTER.—W. Shelly, New York City.
127,806.—GLASS FURNACE.—C. W. Siemens, Westminster, England, and F. Siemens, Dresden, Saxony.
127,807.—PREPARING CRUDE CAMPHOR FOR PRESERVING FURS ETC.—W. F. Simes, Philadelphia, Pa.
127,808.—FARE-BOX.—J. B. Slawson, New York City.
127,809.—POLE-CHANGER FOR ELECTRICAL APPARATUS.—J. E. Smith, New York City.
127,810.—ELECTRO-MAGNETIC MOTOR.—J. Taggart, Boston, Mass.
127,811.—MANUFACTURE OF BOXES, ETC.—J. Trottier, Hennebon, France.
127,812.—APPARATUS FOR THE MANUFACTURE OF VINEGAR.—R. D. Turner, New York City. Ante-dated May 27, 1872.
127,813.—FELTED FABRIC.—E. Waite, Franklin, Mass.
127,814.—MEDICAL COMPOUND AND DISINFECTANT.—J. Walton Newark, Ohio.
127,815.—PRINTING-PRESS.—E. A. Warren, New York City.
127,816.—BRACKET FOR WARP-CREELS.—W. Welch, Woonsocket, R. I.
127,817.—STEAM-HEATER.—S. Williams, Cambridge, Mass.
127,818.—CIRCLE FOR CARRIAGES.—E. Wilson, Prattsburg, N. Y. Ante-dated June 5, 1872.
127,819.—DRAW-BAR IRON FOR BUFFERS OF RAILWAY-CARS.—J. T. Wilson, Pittsburg, Pa.
127,820.—HEAD-PROTECTOR FOR HORSES.—W. H. Wilson, Cynthiana, Ky.
127,821.—AXLE-BOX FOR VEHICLES.—C. Ahrenbeck, Navasota, Texas.
127,822.—WHIFFLETREE FASTENING.—C. Ahrenbeck, Navasota Texas.
127,823.—HUB FOR CARRIAGE-WHEELS.—A. Allcott, Haverhill, Mass.
127,824.—WHEEL FOR VEHICLES.—S. Atha, West Liberty, Ohio.
127,825.—STEAM SHIP AND BOAT.—B. T. Babbitt, New York City.

127,826.—Canal-boat.—B. T. Babbitt, New York City.

127,827.—Process of boiling Soap under Pressure.—B. T. Babbitt, New York City.

127,828.—Manufacture of Soaps.—B. T. Babbitt, New York City.

127,829.—Light-intensifying Attachment for Gas-burners.—S. T. Bacon, Boston, Mass.

127,830.—Heating-stove.—J. F. Baldwin, Lockport, N. Y.

127,831.—Clothes-wringer.—C. H. Bangs, Farmington, Maine.

127,832.—Bustle.—J. I. Barnum, asgr. to himself and J. L. Harlem, Brooklyn, N. Y.

127,833.—Piston-packing.—C. S. Barry, asgr. to H. Blundell, agent, Providence, R. I.

127,834.—Metallic Piston-rod Packing.—C. S. Barry, asgr. to H. Blundell, agent, Providence, R. I.

127,835.—Button-hole Cutter.—C. E. Bean, asgr. to J. L. Mudge, Oswego, N. Y.

127,836.—Furnace for Kilns.—O. Bennett, Boston, Mass.

127,837.—Clamp for moving Pianos.—D. Benson, Syracuse, N. Y.

127,838.—Machine for burnishing Shanks for Boots and Shoes.—J. K. Blanchard and F. S. Hunt, Lynn, and A. C. Carey, Malden, asgrs. to D. Peabody, trustee, Lynn, Mass.

127,839.—School-desk.—W. Blackburn, Manchester, Great Britain.

127,840.—Tug for Harness.—N. Botsford, Lockport, N. Y.

127,841.—Shuttle-box-actuating Mechanism.—J. Brierly, Worcester, and J. Brierly, Milbury, Mass.

127,842.—Bench-plane.—J. Brooks, Boston, Mass. Ante-dated May 28, 1872.

127,843.—Detachable Horse-shoe Calks.—J. E. Byers, Butler, Pa.

127,844.—District and Fire-alarm Telegraph.—E. A. Calahan, Brooklyn, N. Y.

127,845.—Safety-pocket.—S. Chittenden, Willimantic, Conn.

127,846.—Sliding-door Hanger.—C. B. Clark, Buffalo, N. Y.

127,847.—Shoe-fastening.—J. R. Cluxton, Hillsborough, Ohio.

127,848.—Constructing Hollow Wall.—F. Collin, Detroit, Mich.

127,849.—Rifle-barrel.—M. S. Colvin, East Randolph, N. Y.

127,850.—Waste-water Pipe.—J. Conver and C. B. Koons, Philadelphia, Pa.

127,851.—Cork-fastening for Bottles.—J. Conner, Brooklyn, N. Y.

127,852.—Churn.—A. G. Crane, Ottumwa, Iowa.

127,853.—Drop-hammer.—J. E. Crisp, Charlestown, Mass.

127,854.—File-cutting Machine.—J. E. Crisp, Charlestown, Mass.

127,855.—Mechanical Movement.—M. S. Davis, Vincennes, Ind.

127,856.—Screen for Coal-gas Purifiers.—G. W. Day, asgr. to himself and L. Day, Haverhill, Mass.

127,857.—Railway-car Axle.—J. H. Dinsmore, Boston, Mass.

127,858.—Sizing Paper, etc.—J. M. Dorlan, East Brandywine Township, Pa.

127,859.—Machine for packing Tobacco.—D. Eaton, asgr. to E. E. Eaton, St. Louis, Mo.

127,860.—Railway Rails and Chairs.—W. Foster, Goodland, Ind.

127,861.—Bed-plate for Boot and Shoe Heeling Machines.—C. L. Frye, Marlborough, Mass.

127,862.—Caster.—E. G. Gory, Cincinnati, Ohio.

127,863.—Refrigerator.—J. Gravenstine, Philadelphia, Pa.

127,864.—Refrigerator.—J. Gravenstine, Philadelphia, Pa.

127,865.—Magazine for Heating-stoves.—W. A. Greene, asgr. to J. H. Burtis, Brooklyn, N. Y.

127,866.—Tailor's Heating-stove.—J. R. Groves, Hightstown, N. J.

127,867.—Sewing-machine.—C. Gullmann, Paterson, N. J.

127,868.—Car-axle.—M. P. Hadley, Bluffton, Wis.

127,869.—Portable Fare-box.—J. S. Hagerty, Baltimore, Md.

127,870.—Reversible Latch.—J. Hamill, Allegheny, Pa.

127,871.—Corn-planter.—S. H. Hamilton, Deerfield, N. J.

127,872.—Thrashing Machine.—G. B. Hamlin, Willimantic, Conn.

127,873.—Spring-gun.—W. W. Hannah, Hudson, N. Y.

127,874.—Pressure-gauge.—T. C. Hargrave, Boston, Mass.

127,875.—Device for moistening the Legs of Horses.—G. J. Harris, New York City.

127,876.—Horse Hay-rake.—J. Harris, Mount Vernon, Ind.

127,877.—Street-car Signal.—J. C. Harris, Philadelphia, Pa.

127,878.—Plow.—W. Haslup, asgr. to himself, G. G. Haslup, Sen., and R. B. Haslup, Sidney, Ohio.

127,879.—Twine or Thread-cutting Machine.—C. Higby, New Brighton, Pa.

127,880.—Oil-well Pump.—A. S. Hill, Pleasantville, Pa.

127,881.—Clothes-drier.—J. O. Hill, Carbondale, Ill.

127,882.—Book-binder's Clamp.—G. F. Holland, Boston, Mass. Ante-dated May 28, 1872.

127,883.—Faucet.—N. Hotz, Green Point, Brooklyn, N. Y.

127,884.—Dust-conveyers for Thrashing Machines.—J. B. Hunsberger, Vincent, Pa.

127,885.—Operating Rail and Tramway automatically.—C. W. Hunt, West Brighton, N. Y.

127,886.—Portable Billiard-table.—E. Hunt, Philadelphia, Pa.

127,887.—Animal-trap.—L. E. Ingersoll, Columbus, Pa.

127,888.—Spring Rocking-chair.—P. C. Ingersoll, Green Point, N. Y.

127,889.—Truss.—N. Jones, Syracuse, N. Y.

127,890.—Truss.—N. Jones, Syracuse, N. Y.

127,891.—Seat.—Seat for Halls, Churches, etc.—J. L. Kapple, Erie, Pa.

127,892.—Hammock Bedstead.—J. M. Kilner, Chester Castle, Chester, Great Britain. Ante-dated June 8, 1872.

127,893.—Apparatus for generating Carbonic Acid.—L. Kimball, Bradford, Mass.

127,894.—Car-coupling.—F. L. Kirkbride, Wyandotte, Kan.

127,895.—Washing Machine.—J. Klein, Allentown, Pa.

127,896.—Roofing Machine.—C. B. Koons, Philadelphia, Pa.

127,897.—Combined Truck and Hoist.—H. Kruse, asgr. to himself and H. Krueger, Jun., Philadelphia, Pa.

127,898.—Milk-cooler.—A. Kuster and X. Marzolf, Strikersville, N. Y.

127,899.—Iron Folding-chair.—J. Lauer, asgr. to himself and G. C. Tobias, Chicago, Ill.

127,900.—Culinary Utensils.—S. Lee, Taunton, Mass.

127,901.—Liquid Soap or Detergent Compound.—J. Leetch, London, England.

127,902.—Dynamometer-wrench.—H. R. Leonard, Portland, Oregon.

127,903.—Oyster Nursery.—B. F. Lyford, San Francisco, Cal.

127,904.—Machine for burnishing Edges of Boots and Shoes.—J. W. Maley, Boston, asgr. to the Hodges Edge-trimming and Setting Machine Association, Lynn, Mass.

127,905.—Wafer Iron.—G. W. Mason, Jersey City, N. J., asgr. to J. Savery's Sons, New York City.

127,906.—Sash-holder.—E. P. Masterson, Port Jarvis, N. Y.

127,907.—Liquid-meter.—H. S. Maxim, asgr. to himself and T. B. Curtis, Brooklyn, N. Y.

127,908.—Stove-pipe Coupling.—J. T. McKim, Remington, Ind.

127,909.—Propeller.—C. F. Miller and M. Priester, New York City.

127,910.—Construction of Railway.—W. S. Morrow, Newville, Pa.

127,911.—Canal-boat Propulsion.—M. P. Muller, A. Schwaab, and F. Krenson, Savannah, Ga.

127,912.—Fanning Mill.—A. Niebel, Tiffin, Ohio.

127,913.—Hot-air Furnace.—E. D. Norcross, Boston, Mass.

127,914.—Soldering-iron.—N. G. Numsen, asgr. to W. Numsen & Sons, Baltimore, Md.

127,915.—Grain-separator.—G. S. Nutter and H. Nutter, asgrs. of one-third of their right to C. H. Nutter, Bunker Hill, Ill.

127,916.—Fireplace Grate.—M. Ohmer, Dayton, Ohio.

127,917.—Feed-water Regulator and Low-water Alarm for Steam-boilers.—W. Painter, asgr. of one-half his right to L. R. Keizer, Baltimore, Md.

127,918.—Tail-net for Horses.—F. Parson, St. Louis, Mo., and E. W. Parker, Penn Yan, N. Y.

127,919.—Refrigerator.—C. O. Peck, Pittsfield, Mass.

127,920.—Mounting Photographs.—A. C. Platt, Sandusky, Ohio.

127,921.—Lumber-rack.—W. H. Powers, Grand Rapids, Mich.

127,922.—Wagon-wheel.—J. Priest, asgr., by mesne-assignment, to himself, H. M. Park, I. H. McCollum, and B. A. Leonard, Detroit, Mich.

127,923.—Artificial Stone.—W. W. Reeves, Braddock's Field, Pa.

127,924.—Weather-strip for Doors.—D. B. Robbins and H. Minuse, Milan, Ohio.

127,925.—Medical Compound for treating Ringworm, etc.—P. Roskopf, Brooklyn (E. D.), N. Y.

127,926.—Water Filter and Cooler.—L. Scharff, Spring Mill, Pa.

127,927.—Toy.—J. Schwennesen, Chicago, Ill.

127,928.—Oscillating Engine.—W. Sellers, Philadelphia, Pa.

127,929.—Turning-lathe.—W. Sellers, Philadelphia, Pa.

127,930.—Machine for removing Snow from Railways.—G. Sewell, Brooklyn, N. Y.

127,931.—Electric Annunciator.—J. B. Shannon, Philadelphia, Pa.

127,932.—Horse-shoe.—A. W. Smith, Manchester, N. H.

127,933.—Steam Bell-ringer.—G. B. Snow, asgr. to Buffalo Dental Manufacturing Co., Buffalo, N. Y.

127,934.—Self-heading Bolt.—B. B. G. Stone, Catskill, N. Y.

127,935.—Cultivator.—J. G. Stowe, asgr. to Bloomington Manufacturing Company, Bloomington, Ill.

127,936.—Circular-saw Mill.—A. Talbott, Richmond, Va.

127,937.—Potato-digger.—De W. C. Thomas, Easton, N. Y.

127,938.—Corn-planter.—G. Thompson, Springfield, Ill. Ante-dated May 29, 1872.

127,939.—Cigar.—M. Turley and Jane M. Innes, Council Bluffs, Iowa.

127,940.—School Desk and Seat.—J. Upham and W. H. Kline, Easton, Ohio.

127,941.—Shutter-fastener.—C. S. Van Wagoner, New York City.

127,942.—Water-meter.—H. F. Wheeler and T. W. Lane, Boston, Mass.

127,943.—Rotary Engine.—J. C. Wilson, asgr. to S. Norris, London, England.

127,944.—Beverage and Sirup from Mustang Grapes.—J. C. Wood, Larissa, Texas.

RE-ISSUES.

4,938.—Wheel for Vehicles.—S. Atha, West Liberty, Ohio. Patent No. 96,656, dated Nov. 9, 1869.

4,939.—Cultivator.—J. H. Brinton, Thornbury Township, Pa. Patent No. 84,935, dated Dec. 15, 1868.

4,940.—Spring Bed-bottom.—E. Krieghoff, asgr. to I. Pechner, New York City. Patent No. 66,593, dated July 9, 1867.

4,941.—Base-burning Fireplace Heater.—B. C. Bibb and H. Aukee, Baltimore, Md.; said Aukee asgr. to D. Stuart and R. Peterson, Philadelphia, Pa. Patent No. 32,176, dated April 30, 1861.

4,942.—Rubber Packing.—C. L. Frink, asgr., by mesne-assignments, to O. T. Earle, Rockville, Conn. Patent No. 54,523, dated May 8, 1866.

4,943.—Plow.—M. L. Gibbs, Canton, Ohio. Patent No. 116,048, dated June 20, 1871.

4,944.—Harvester.—F. T. Lomont and J. Grojean, Massillon, asgrs., by mesne-assignments, to W. K. Miller, Canton, Ohio. Patent No. 27,641, dated March 27, 1860.

4,945.—Harvester.—(Div. A.)—C. Wheeler, Auburn, N. Y. Patent No. 682, dated March 12, 1861.

4,946.—Harvester.—(Div. B.)—C. Wheeler, Jun., Auburn, N. Y. Patent No. 682, dated March 12, 1861.

DESIGNS.

5,911.—Carpet-pattern.—T. Barclay, asgr. to Lowell Manufacturing Company, Lowell, Mass.

5,912 to 5,916.—Carpet-pattern.—R. R. Campbell, asgr. to Lowell Manufacturing Company, Lowell, Mass.

5,917.—Card-basket.—G. D. Dudley, asgr. to Woods, Sherwood & Latham, Lowell, Mass.

5,918.—Vase.—N. L. Glauber and A. Schlank, New York City.

5,919.—Campaign Badge.—E. W. Harrison, Jersey City, N. J.

5,920.—Canceled.

5,921.—Carpet-pattern.—L. Jullien, Passy, France.

5,922.—Carpet-pattern.—C. S. Lilley, asgr. to Lowell Manufacturing Company, Lowell, Mass.

5,923.—Carpet pattern.—D. McNair, asgr. to Lowell Manufacturing Company, Lowell, Mass.

5,924.—Trunk Corner-clamp.—W. Bruen, Newark, N. J.

5,925.—Buckets.—H. Everett, Philadelphia, Pa.

5,926.—Pickle-stand and Bottle.—G. Gill, asgr. to Reed & Barton, Taunton, Mass.

5,927.—Badge.—J. Hartmann, Jun., Ormsby, Pa.

5,928.—Fireplace Stove.—W. J. Keep, Troy, N. Y.

5,929.—Heating-stove.—W. J. Keep, Troy, N. Y.

5,930.—Heating-stove.—E. Mingay, Boston, Mass.

5,931.—Body of a Toy-carriage.—F. W. Porter, Springfield, Vt.

5,932.—Floor Oil-cloth Pattern.—V. E. Meyer, Lyon's Farms, Elizabeth, N. J., asgr. to Deborah Powers, A. E. Powers, and N. B. Powers, Lansingburg, N. Y.

5,933.—Cooking-stove.—F. H. Root, asgr. to Jewett & Root, Buffalo, N. Y.

5,934 and 5,935.—Hot-air Register.—E. A. Tuttle, asgr. to the Tuttle & Bailey Manufacturing Company, New York City.

5,936.—Heating-stove.—N. S. Vedder, Troy, and T. S. Heister, Lansingburg, asgrs. to Jewett & Root, Buffalo, N. Y.

TRADE-MARKS.

852.—Wines and Liquors.—A. W. Balch & Co., New York City.

853.—Preserved Fish.—J. H. Doxsee, Islip, N. Y.

854 and 855.—Brandy.—J. Hennessy & Co., Cognac, France.

856.—Biscuits and Crackers.—J. B. Kupfer, Kenosha, Wis.

857.—Salve.—Mary A. Paullin, Philadelphia, Pa.

858.—Crushed White Wheat.—F. E. Smith & Co., Brooklyn N. Y.

859.—Polish for Metals.—F. J. Tinkham, New York City

860.—Elastic Webbing.—J. Twamley, New York City.

EXTENSIONS REFUSED.

20,447.—Whitewash Brush.—D. W. Shaw and W. Magraw June 1, 1858. Refused May 31, 1872.

20,492.—Platform Scale.—J. F. Keeler, June 8, 1858. Refused June 5, 1872.

20,515.—Harvesting Machine.—W. H. Seymour and D. S. Morgan, June 8, 1858. Refused June 5, 1872.

20,522.—Grain-separator.—A. J. Vandegrift, June 8, 1858. Refused June 5, 1872.

DISCLAIMERS.

20,503.—Breech-loading Firearm.—G. W. Morse. Dated June 8, 1858; extended June 7, 1872; disclaimer filed June 7, 1872.

2,182 of 1861; whole No. 33,186.—Thrashing Machine.—D. M. Cochrane. Dated Sept. 3, 1861; re-issue No. 1,617, Feb. 16, 1864; joint disclaimer filed June 7, 1872.

APPLICATIONS FOR EXTENSIONS.

Opponents of extensions must file *written* objections in the Patent Office at least 20 days before the day-of-hearing; and on that day, at noon, they must appear personally, or by proxy, at the Patent Office, and state the reasons of their opposition. All testimony—*pro* or *con*—must be taken and transmitted in accordance with the official rules, which will be furnished on application. The under-named patentees have recently petitioned for extensions (for seven years) of patents granted to them in the year 1858:—

F. R. Myers and T. H. Furniss, Cleveland, Ohio.—*Couch for Railroad-cars.*—Patented Sept. 7, 1858; testimony will close on Aug. 6, next; last day for filing arguments and examiner's report, Aug. 16; day-of-hearing, Aug. 21.

Alexander Richart, Schoharie, N. Y.—*Machine for turning Hubs.*—Patented Sept. 7, 1858; testimony will close on Aug 6, next; last day for filing arguments and examiner's report Aug. 16; day-of-hearing, Aug. 21.

Clayton Lippincott, administrator of Sherburne C Blodgett, deceased, Moorestown, N. J.—*Sewing-machine.*—Patented Sept. 7, 1858; testimony will close on Aug. 6, next last day for filing arguments and examiner's report, Aug. 16 day-of-hearing, Aug. 21.

Harlow H. Thayer, Boston, Mass.—*Journal-box.*—Patented Sept. 7, 1858; testimony will close on Aug. 6, next; last day for filing arguments and examiner's report, Aug. 16; day-of-hearing, Aug. 21.

Albert W. Gray, Middletown, Vt.—*Link of Horse-powers.*—Patented Sept. 9, 1857; and re-issued July 1, 1862; testimony will close on Aug. 6, next; last day for filing arguments and examiner's report, Aug. 16; day-of-hearing, Aug. 21.

Cornelius W. Van Vliet, Huntington, Conn.—*Pin-sticking Machine.*—Patented Sept. 14, 1858; testimony will close on Aug. 18, next; last day for filing arguments and examiner's report, Aug. 23; day-of-hearing, Aug. 28.

Perry G. Gardiner, New York City.—*Furnace for tempering Steel.*—Patented Oct. 19, 1858; testimony will close on Sept 17, next; last day for filing arguments and examiner's report Sept. 27; day-of-hearing, Oct. 2.

QUERIES.

We will hereafter publish in this column such queries as are from their nature likely to elicit practical answers of general utility to our readers. Questions not relating to business, and of merely personal interest to the querist, will not be published here, but we will willingly give them such attention in private

correspondence as we can, without neglect of more important duties. We earnestly solicit from our readers either queries or answers of such a character as we have specified, and we hope by this means to make our paper a valuable medium of intercommunication between them.

1. Will some one give explicit directions for finishing black-walnut wood by varnishing so as to get a very high finish? D. D. A.

2. TEMPERING MILL PICKS.—I wish a good recipe for a solution to temper mill picks, with directions for using the same? R. G.

3. SIZING FOR GILDING.—Will some reader of the ARTISAN give me a recipe for a good sizing for gilding? P. H. E.

4. What is the best practical means of transmitting power through a long distance? E. A.

5. SOLUTION OF TALLOW.—What will dissolve tallow so that it can be used in an oil can without heat, the object being to apply it as a lubricator? L. B. J.

6. Can leather be used to make a porous cell for a battery? A. E. S.

7. SAND AND EMERY BELTS.—How can I make good sand or emery belts for dressing down wood, shaped nearly to the right size in a cutting machine? S. P.

ANSWERS TO QUERIES.

DRAWING-INK.—If H. W. will mix with Arnold's Japan ink, a little beef's gall, it will make an ink that will cross-hatch without blotting, and which will do admirably for pen etching. I hope some one will give a recipe for indelible drawing-ink, as I also, and I doubt not many others, will be glad to get it. C. H., OF KY.

BLUEING PISTOL BARRELS.—W. H. J. will find the following recipe reliable:—Put a quantity of charcoal ashes on a plate of iron or in a box. Heat these over a slow fire. The article to be blued should be placed in the ashes, and as the heat rises take them out to see whether the color approaches the shade desired. When the color strikes a blue on exposure to the air, they should again be heated until they are white, and then taken out and allowed to cool. The rationale of this operation is that a thin film of peroxyd of iron forms upon the surface of the heated metal when brought into contact with the air, which gives to the articles the desired tint. The repetition of the process makes a more permanent blue. The surfaces should be perfectly dry and free from all greasy matters. J. L. H., OF ARK.

INDELIBLE DRAWING-INK.—This is made by dissolving shellac in a hot solution of borax in water, and using the resulting solution instead of simple water for rubbing up India or Japan ink. Pens can be cleaned by alcohol after using this ink. F. P., OF VT.

POWER FOR SAWS.—The number of teeth—everything else being the same—will not make any difference in the power required to cut a given amount of lumber with a saw. A thin saw will cut more lumber with the same power than a thick saw. The greater the number of the teeth, the smoother will be the cut, but there will be no gain in speed of cutting on this account. J. B. J., OF VA.

TELESCOPE.—The only essential difference between a day and a night glass, or a terrestrial and astronomical refracting telescope, is that the day-glass has one more lens, to correct the position of the inverted image, which in an astronomical telescope is unnecessary. SIRIUS.

KEROSENE IN BOILERS.—The idea that kerosene does any good in boilers is simply absurd. On the contrary, it forms a solution of all oily matters, and promotes foaming. To apply it with a brush to the outside of a boiler in order to prevent scale would be just as sensible as to put it inside. M. L. R., OF N. Y.

LEATHER SCRAPS.—A lately invented process for utilizing leather cuttings is as follows:—The shavings are washed clean in water, and then soaked in water containing one per cent. of sulphuric acid till they become soft and plastic. A little glycerine is mixed in with the plastic mass, and the latter is then moderately pressed into forms or rolled into sheets. The material thus made can be used for many purposes, but it will not withstand the action of water.

J. S., OF N. J.—No "power" is gained by a lever, in the mechanical sense of the term, but power in the sense of ability to perform a specific act is gained. It is to be regretted that the term power is retained as a technical term, as it would seem a term not saddled with different meanings might be substituted. "Work," in mechanics, is resistance overcome through distance. Power is the measure of work done in relation to time. It therefore involves the three elements of pressure in pounds, distance in feet, and time estimated in minutes. The standard horse-power is that power that will raise 33,000 lbs. one foot in one minute of time.

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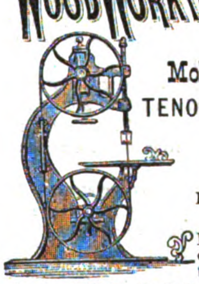

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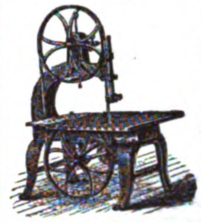

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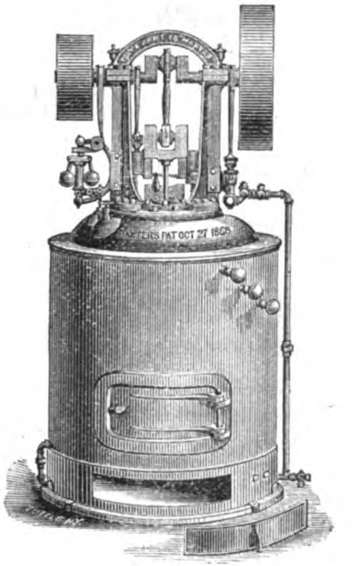

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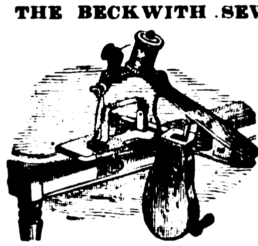

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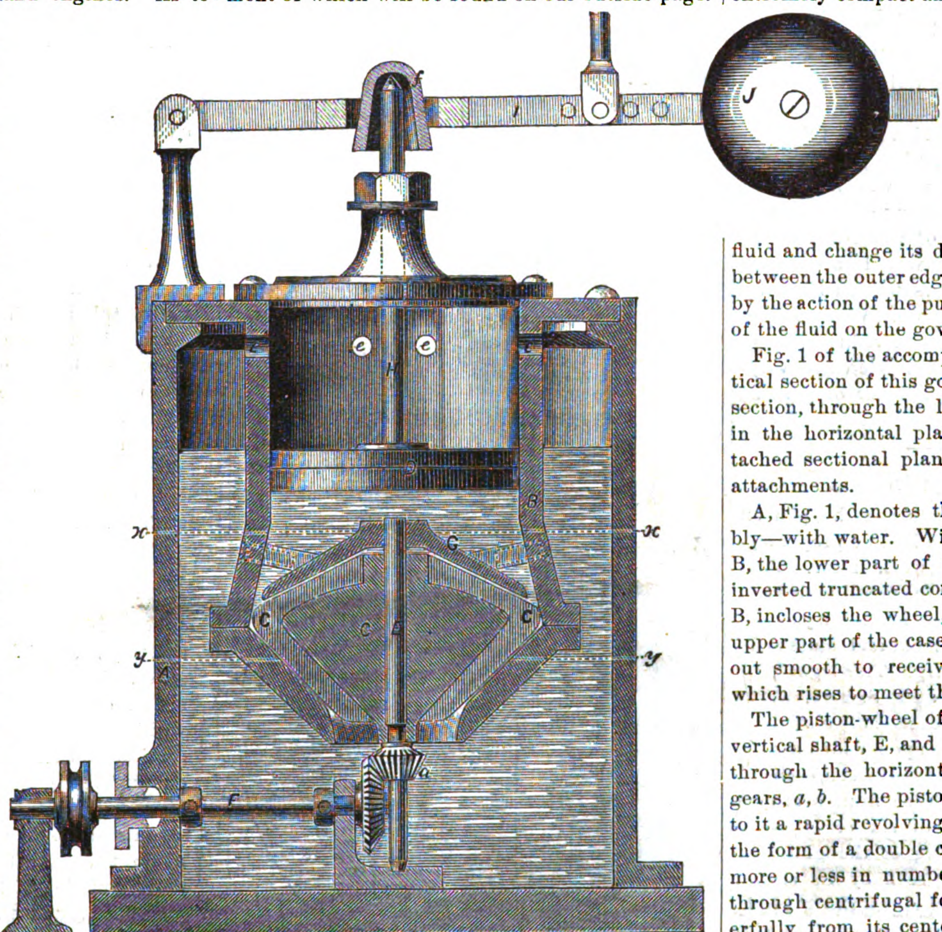
Duff's Governor for Marine and Land Engines and Water-gates.

It is unnecessary to say anything as to the importance of governors for land engines. As to marine governors, the practice of American engineers justifies some remarks. Why it is that with so many facts proving their value, and with all theory in favor of their use, so few governors are placed on our steamers, is difficult to explain. In English practice their use is well-nigh universal. Our own belief is that many an ill-fated vessel has gone to the bottom for want of a reliable regulator for her engines.

In rough weather, when the screw is half of the time out of water, an enormous waste of steam takes place. At one moment the screw is whirling almost without resistance; the next, its blades strike the water with a shock that causes the vessel to tremble from stem to stern. At the very time when in her struggles with the elements she needs her full power, she finds her steam exhausted by spinning a screw out of water, and falls a helpless prey to a power she is incompetent to cope with. The Silver governor is the one most employed on English vessels, and has been found in practice a reliable instrument. Its complication and expense are the only reasons we have heard assigned by American engineers for not adopting it; but these seem insignificant when considered in relation to the great advantages secured by their use. These objections do not, however, exist with the governor we herewith illustrate, a sensitive yet powerful instrument recently patented by Mr. James B. Duff, of Patchogue, N. Y., an advertisement of which will be found on our outside page.



DUFF'S MARINE GOVERNOR.

This invention consists in the arrangement of a centrifugal or rotary pump, receiving motion from a steam-engine, and working in a barrel or cylinder containing a piston which connects with the throttle-valve in such a manner that, when the speed of the engine increases beyond the desired point, the pressure of the fluid brought to bear on the governor-piston by the action of the rotary pump closes the throttle-valve; and, when the speed of the engine decreases, this action is reversed.

We speak from knowledge gained from personal observation of the working of one of these governors when we say that they combine sensitiveness and power to a degree which, so far as we are aware, has not hitherto been attained. They are extremely compact and simple, and can be used to great advantage for marine or land engines, or for gates of water-wheels.

With the rotary pump and governor-piston is combined a concave disk, which is firmly secured in the governor cylinder, and serves to concentrate the fluid and change its direction as it passes through between the outer edge of the disk and the cylinder by the action of the pump, thus producing pressure of the fluid on the governo-rpiston.

Fig. 1 of the accompanying engravings is a vertical section of this governor; Fig. 2, a horizontal section, through the line, *x, x;* Fig. 3 is a section in the horizontal plane, *y, y;* and Fig. 4 is a detached sectional plan view of the lever and its attachments.

A, Fig. 1, denotes the reservoir filled—preferably—with water. Within this reservoir is a case, B, the lower part of which has the shape of an inverted truncated cone. This portion of the case, B, incloses the wheel, C, of a rotary pump. The upper part of the case is cylindrical, and is bored out smooth to receive the piston, D, the rod of which rises to meet the weighted lever.

The piston-wheel of the pump is mounted on a vertical shaft, E, and is propelled by the engine through the horizontal shaft, F, and the bevel gears, *a*, *b*. The piston-wheel has thus imparted to it a rapid revolving motion, and being made in the form of a double cone, with projecting wings, more or less in number according to size, it acts through centrifugal force to throw the water powerfully from its center towards the edge of the double case.

Above this piston-wheel is secured the concave disk, G, which forms a bearing for the upper end of the shaft, E. The diameter of this disk being somewhat less than that of the cylinder, B, an annular opening, *d*, is left, through which the water passes into the space above the disk to act against the piston, D. The piston is packed so as to prevent leakage, yet to work with very little friction. However, whatever fluid passes by the piston es-

Fig. 2.

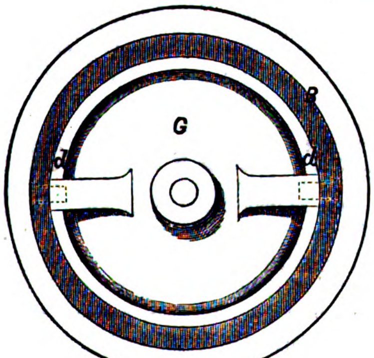


Fig. 4.

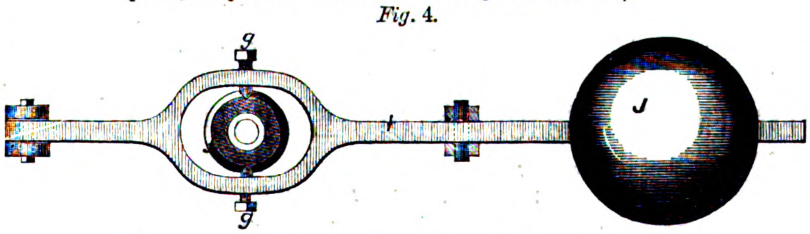
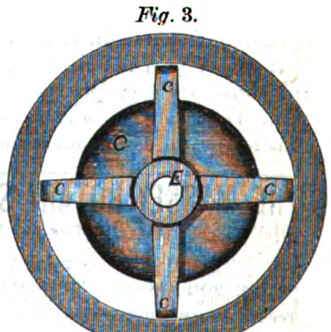


Fig. 3.



capes through ports in the upper part of the cylinder, and is thus restored to the reservoir, A. H is the piston-rod connecting with the lever, I. J is the sliding weight. The end of the piston-rod is connected with the lever by a cap, *f*, hung in screws, *g*.

Now, as to the power of this governor to control a throttle-valve, we can say that the one we inspected, which has an eight-inch piston, when run at by no means excessive speed, raises a 140-lb. weight at the end of the lever, with a leverage of three to one in favor of the weight. The step of the piston-wheel supports only the weight of the wheel itself, and hence is subjected to very slight wear. The journals and boxes of the shaft, F, will wear somewhat, but are easily kept in order, as any mechanic will see for himself. There appears, therefore, nothing which will be likely to get out of order, or any essential part that will fail in durability.

We therefore are of the opinion that this governor is the best of its class that has yet appeared, and believe it will satisfy those who inspect its working of its entire adaptability to land or marine engines. For the gates of water-wheels we think it peculiarly fitted, and would call the attention of hydraulic engineers to it, as worthy their attention for this purpose. Various sizes are made, from four-inch to twelve-inch piston diameter, the power upon the throttle-valve varying from one to any required number of pounds, according to size and speed.

Railroad Signals.

PROBABLY half the accidents that happen on railroads are occasioned by the lack of proper signals to show the distance between trains. That difficulty now seems to be overcome, judging from the description of a late invention just put in operation on the Vermont and Massachusetts Railroad at Fitchburg. This signal, which is the joint invention of F. S. & W. A. Foster, of Fitchburg, is a circle made of colored glass, red, green, and white, upon which are figures plainly marked from one to fifteen, each figure denoting a minute. These figures are shown through an opening of six or eight inches in the outside covering of the glass, so that they can be readily seen by the engineer in the daytime, and at night the glass is illuminated by a lantern placed inside. The signal is operated by the train passing over the rail. As the engine passes the signal turns back to the starting point, from the figure showing the lapse of time between the two trains, and remains stationary until the last car passes, when it commences to revolve, keeping time in precisely the same manner as a clock, the figures passing the opening in regular order up to fifteen, provided that time elapses before the arrival of the next train, when the same process is repeated. The invention certainly seems to be what is desired, and if it really fulfills all that is claimed for it, it will lessen the number of casualties on the roads adopting it, and render a recurrence of accidents like the terrible one of a year ago simply impossible.

CURE FOR CORNS.—The *Chemist and Druggist* prescribes as follows:—Bathe the feet well in warm water, then with a sharp instrument pare off as much of the corn as can be done without pain or causing it to bleed, and dress once a day, with the following salve:—

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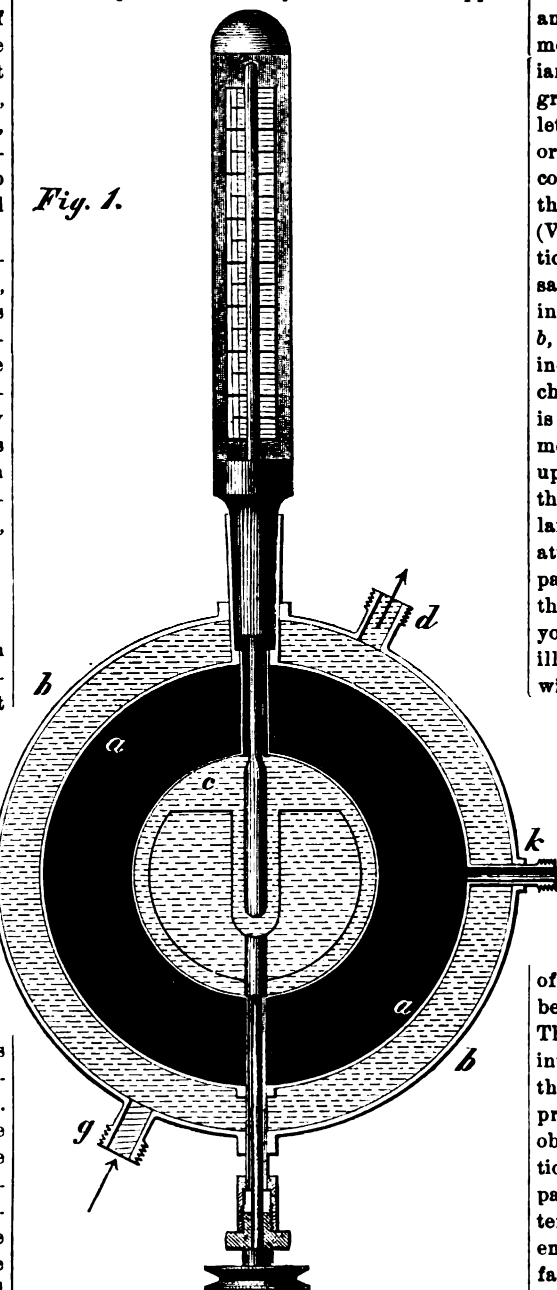
RADIATION AT DIFFERENT TEMPERATURES.*

BY CAPTAIN JOHN ERICSSON.

BALFOUR STEWART states, in his "Elementary Treatise on Heat," that "Newton was the first to enunciate his views on the cooling of bodies. He supposed that a heated body exposed to a certain cooling cause would lose at each instant a quantity of heat proportionate to the excess of its temperature above that of the surrounding air." In order to prove the fallacy of Newton's supposi-

Fig. 1.



tion, Prof. Stewart presents the following extract from the work of MM. Dulong and Petit:—

Excess of Temperature of the Thermometer. °C	Velocity of Cooling. °C
240	10·69
220	8·81
200	7·40
180	6·10
160	4·89
140	8 88
120	8·02
100	2·30
80	1·74

"We see at once from this table," says Prof. Stewart, "that the law of Newton does not hold, for according to it the velocity of cooling for an excess of 200° should be precisely double of that for an excess of 100°; now we find that it is more than three times as much." The author of the "Elementary Treatise on Heat" thus assumes that the velocity of cooling established by Dulong and Petit represents the radiant energy or quantity of heat transmitted by the radiator. Consequently the amount of energy at 200° is assumed to be 10·69+1·74—6·14 times greater than at 80°; while, agreeably to Newton's law, the increase of radiant energy should be proportional to the differential temperature, viz., 240+80—3 times that of the tabulated temperate of 80°. Modern research having established that radiant heat is energy amenable to the laws of dynamics, it may be demonstrated that the deviation from the Newtonian doctrine assumed by Dulong and Petit is groundless; but, before considering the theory, let us examine the practical result of recent elaborate experiments conducted with an apparatus containing the spherical radiator adverted to in the preceding article on "Solar Temperature" (Vol. V. pp. 505-507). The accompanying illustration (Fig. 1) represents a vertical section of the said apparatus, *a* being a spherical vessel 5 inches in diameter, suspended within an exterior casing, *b*, filled with water. A spherical radiator, *c*, 2·75 inches in diameter, composed of very thin copper, charged with water and coated with lampblack, is sustained in the center of the sphere, *a*, by means of tubes applied above and below. The upper tube is large enough to admit the bulb of a thermometer, the lower one being only sufficiently large to accommodate a small axle, to which is attached a paddle-wheel, provided with curved paddles, arranged in such manner that the bulb of the thermometer may be inserted considerably beyond the center of the sphere, as shown in the illustration. The external casing, *b*, is provided with nozzles, *g* and *d*, to which tubes are attached for circulating cold water through the annular space during experiments. The air is exhausted from the spherical inclosure through the tube, *k*, which passes across the annular space. It will be evident that the centrifugal action of the paddles of the wheel applied within the radiating sphere will produce a continuous current from the center towards the circumference, the fluid successively passing over and coming in contact with the inside of the thin shell, then returning to the center to be again thrown off by the centrifugal action. The rotary motion of the water, kept up without intermission round the cylindrical bulb of the thermometer, will evidently render its indication prompt and reliable. It is hardly necessary to observe that the rapid presentation of fresh particles of water promoted by the action of the paddles will effectually prevent the reduction of temperature to proceed faster at the circumference than at the center, the radiation at the surface, in virtue of the continuous interchange of particles, affecting almost simultaneously every molecule within the sphere. Consequently the total energy of radiation will be rendered available in reducing the temperature of the contents of the radiator, while the central thermometer will indicate at every instant the precise degree of temperature of the entire mass.*

The mode of conducting the experiment will be seen by the following statement:—A wooden cistern containing 16 gallons, charged with water

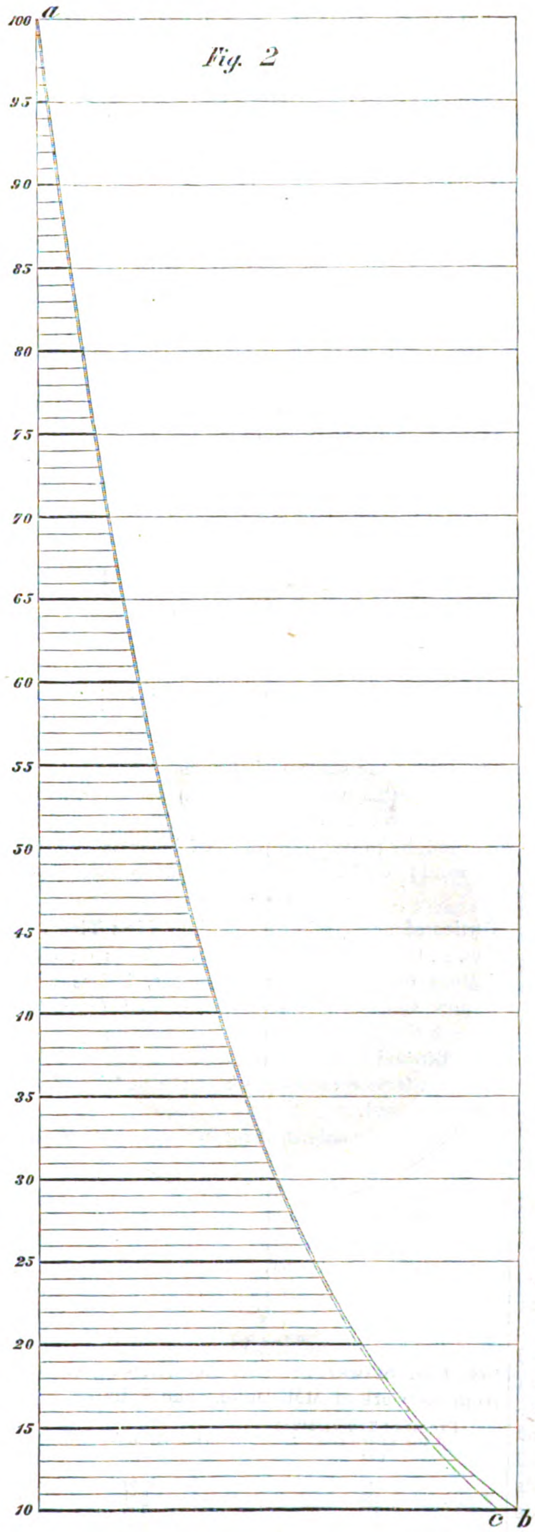
* *Nature*, June 6, 1872.

* It might be supposed that the motion of the water within the radiating sphere, produced by the action of the paddle-wheel, will occasion an elevation of temperature tending to render the indication of the central thermometer inaccurate. The requisite speed of the wheel being 30 turns per minute, experiments have been made to ascertain if at that rate heat is produced; but no elevation of temperature has been observed. The diameter of the wheel being 2·37 inches, the maximum speed of the particles of water produced by the rotation is scarcely 3 8 inches per second, a velocity too small to generate appreciable heat.

and crushed ice, is connected by flexible tubes to the nozzles, *g* and *d*, on opposite sides of the annular space, a pump being applied between the cistern and the said nozzles, by means of which the cold water is forced through the apparatus and then returned to the cistern.

In view of the great importance of the question at issue, the investigation has been conducted with the utmost care, four operators having invariably been employed during the experiments, the labor being thus divided :—First operator regulates the temperature of the water in the cistern by continual agitation and supply of crushed ice from time to time ; second operator works the pump at a uniform rate ; third operator turns the paddle-wheel, and reads the thermometer under a magnifying glass, calling time for each degree at the instant when the top of the mercurial column is covered by half the thickness of the line on the scale. Lastly, the fourth operator, provided with a Casella chronograph, records the time called. It will be seen presently that, notwithstanding this procedure, there is a slight discrepancy in the ratio of temperature and time, viz., the increment of time for each degree is not regular. Obviously the most practised eye cannot determine exactly at what moment the top of the falling column is half covered by the line on the thermometric scale. Again, a perfectly graduated thermometer cannot be obtained. But the discrepancy referred to in reality only disfigures the record, since the computations are based on *mean* time. Referring to the accompanying table, it will be seen that the rate at which the spherical radiator cools has been recorded separately for each degree of differential temperature from 100° to 10°, the inclosure being maintained at a constant temperature of 33°. Regarding the construction of the table, it will suffice to state that the time entered in the fourth column is that shown by the chronograph. It will be evident on reflection that the increment of time for each successive degree of differential temperature expresses very nearly the rate of cooling ; but, the recorded times being irregular, from causes already pointed out, the true increment cannot be determined without ascertaining the mean time recorded by the chronograph. This mean time will be found in the fifth column, the true increment, viz., the number of seconds during which the temperature of the radiator falls one degree, being entered in the last column.

Let us now examine the accompanying diagram, Fig. 2, in which the ordinates of the curve, *a b*, represent the observed time for each degree of differential temperature, while the ordinates of the curve, *a c*, represent the corrected time. The diagram having been constructed with the utmost exactness, in accordance with the temperature and time in the table, mere inspection will show that the observed and corrected times have produced curves nearly identical. Agreeably to Newton's law, the rate of cooling is proportional to the excess of temperature of a body above that of a surrounding medium. Hence, the increment of time for each degree, in other words, the number of seconds occupied in reducing the temperature of the radiator 1° (inserted in the last column of the table), should be proportional to the differential temperature inserted in the third column. For instance, the rate of cooling at a differential temperature of 49° being 39·80 seconds for 1°, it should be $49 \times 39{\cdot}8 \div 31 = 62{\cdot}90$ seconds for an equal thermometric interval at a differential temperature of 31°. Referring to the table, it will be found that the rate thus computed agrees exactly with the increment of time inserted in the last column opposite the differential temperature 31°.



Applying a similar test to the other differential temperatures and rates of cooling contained in the table, the same exact agreement will be found to exist. Consequently, our table and diagram prove that the rate of cooling is proportional to the differential temperature, thus establishing the correctness of the Newtonian law. Regarding the discrepancy indicated by the slight irregularity of the curve, *a b*, the writer attributes the same to the difference of emissive power of the radiator at different temperatures. It was stated in the preceding article (Vol. V. pp. 505–507) that the radiant power of one square foot of cast-iron develops 0·080 thermal unit per minute for each degree of differential temperature at 65°, and 0·337 unit at 3,000° ; hence that the emissive power is increased $0{\cdot}337 \div 0{\cdot}080 = 4{\cdot}21$ times for an increment of $3{,}000 - 65 = 2{,}935°$. Experiments conducted in the meantime show that the radiant power of one square foot of cast-iron maintained at a differential temperature of 1,800° is 335 units per minute, hence that the emissive power at this stage of incandescence amounts to $335 \div 1{,}800 = 0{\cdot}186$ unit for each degree of differential temperature. Our investigations have thus proved that at 65° the emissive power is 0·080 thermal unit, at 1,800°, 0·186 unit, and at 3,000°, 0·337 for each degree of differential temperature. We have accordingly established the fact that the emissive power increases nearly in the same ratio as the intensities, being fully quadrupled between the differential temperature of 65° and 3,000°. Let us be careful not to confound this increase of emissive power with the increase of radiant energy resulting from mere augmentation of temperature. It is, no doubt, owing to the change of the molecular constitution of the body during heating that the dynamic energy developed at a differential temperature of 3,000° is 4·21 times greater than it should be in accordance with the Newtonian law—a trifling increase, however, compared with that resulting from adopting the computations of Dulong and Petit, whose formula shows that for the stated range of temperature the ratio of radiant energy will be increased more than 4,000 times. It would be premature to attempt to explain the cause of the change of the radiant properties of metals at different temperatures disclosed by our experiments, until further investigations shall have established the exact relation between the actual and theoretical energy developed. Considering the difference of molecular motion within metallic bodies at white heat, in a state of fusion, and at the freezing point of water, we need not be surprised at the variation of emissive power observed during our experimental investigation. Nor are we justified, in view of this variation of emissive power, in questioning the correctness of Sir Isaac Newton's assumption that heated bodies of definite radiant properties develop mechanical energies proportional to their excess of temperature over the surrounding media.

Temp. of the radiating sphere.	Temp. of inclosure.	Differential Temp.	Observed Time.	Corrected Time.	Increment of time for each degree.
Fahr. °	Fahr. °	Fahr. °	Seconds.	Seconds.	Seconds.
133	33	100	19·5	19·50	19·50
132	33	99	39	39·19	19·69
131	33	98	58	59·08	19·89
130	33	97	77	79·18	20·10
129	33	96	97	99·49	20·31
128	33	95	117	120·01	20·52
127	33	94	138	140·75	20·74
126	33	93	158	161·71	20·96
125	33	92	179	182·90	21·19
124	33	91	200	204·32	21·42
123	33	90	222	225·98	21·66
122	33	89	244	247·89	21·91
121	33	88	266	270·04	22·16
120	33	87	288	292·45	22·41
119	33	86	311	315·12	22·67
118	33	85	333	338·06	22·94
117	33	84	356	361·27	23·21
116	33	83	379	384·76	23·49

Temp. of the radiating sphere.	Temp. of inclosure.	Differential Temp.	Observed Time.	Corrected Time.	Increment of time for each degree.
Fahr. °	Fahr. °	Fahr. °	Seconds.	Seconds.	Seconds.
115	33	82	402	408·54	23·78
114	33	81	425	432·61	24·07
113	33	80	448	456·98	24·37
112	33	79	471	481·66	24·68
111	33	78	495	506·66	25·00
110	33	77	520	531·99	25·33
109	33	76	545	557·65	25·66
108	33	75	571	583·65	26·00
107	33	74	597	610·00	26·35
106	33	73	624	636·71	26·71
105	33	72	651	663·79	27·08
104	33	71	679	691·25	27·46
103	33	70	708	719·10	27.85
102	33	69	737	747·36	28·26
101	33	68	766	776·03	28·67
100	33	67	796	805·13	29·10
99	33	66	827	834·67	29·54
98	33	65	858	864·67	30·00
97	33	64	889	895·14	30·47
96	33	63	920	926·09	30·95
95	33	62	953	957·54	31·45
94	33	61	985	989·51	31·97
93	33	60	1017	1022·01	32·50
92	33	59	1050	1055·66	33·05
91	33	58	1084	1088·68	33·62
90	33	57	1118	1122·89	34·21
89	33	56	1152	1157·71	34·82
88	33	55	1188	1193·16	35·45
87	33	54	1220	1229·27	36·11
86	33	53	1257	1266·06	36·79
85	33	52	1294	1303·56	37·50
84	33	51	1331	1341·79	38·23
83	33	50	1371	1380·79	39·00
82	33	49	1408	1420·59	39·80
81	33	48	1448	1461·22	40·63
80	33	47	1489	1502·71	41·49
79	33	46	1530	1545·10	42·39
78	33	45	1572	1588·43	43·33
77	33	44	1615	1632·75	44·32
76	33	43	1659	1678·10	45·35
75	33	42	1704	1724·53	46·43
74	33	41	1751	1772·09	47·56
73	33	40	1802	1820·84	48·75
72	33	39	1852	1870·84	50·00
71	33	38	1904	1922·16	51·32
70	33	37	1958	1974·86	52·70
69	33	36	2015	2029·02	54·16
68	33	35	2070	2084·73	55·71
67	33	34	2128	2142·08	57·35
66	33	33	2188	2201·17	59·09
65	33	32	2250	2262·11	60·94
64	33	31	2313	2325·01	62·90
63	33	30	2379	2390·01	65·00
62	33	29	2448	2457·25	67·24
61	33	28	2520	2526·89	69·64
60	33	27	2595	2599·11	72·22
59	33	26	2674	2674·11	75·00
58	33	25	2754	2752·11	78·00
57	33	24	2839	2833·36	81·25
56	33	23	2929	2918·14	84·78
55	33	22	3025	3006·78	88·64
54	33	21	3126	3099·64	92·86
53	33	20	3232	3197·14	97·50
52	33	19	3343	3299·77	102·63
51	33	18	3459	3408·10	108·33
50	33	17	3581	3522·80	114·70
49	33	16	3715	3644·67	121·87
48	33	15	3859	3774·67	130·00
47	33	14	4015	3913·95	139·28
46	33	13	4185	4063·95	150·00
45	33	12	4370	4226·45	162·50
44	33	11	4571	4398·73	177·28
43	33	10	4792	4593·73	195·00

[The engraver has indicated, in Fig. 2, a continuous space between the curves *a b* and *a c*, whereas the space should cease at one portion, the curves intersecting each other between the ordinates 25 and 30. The mistake, however, is so trifling that it can scarcely be observed with the naked eye. It is to be found, on looking at the table, that the observed times are shorter than the calculated times at the high temperatures, while the observed times are longer than the calculated times at low temperature; hence the curves must intersect each other.—Ed.]

Science in Agriculture.

The proceedings of the recent Agricultural Congress held in St. Louis demonstrate that there has been but little substantial improvement in farming, in spite of model plows and patent reapers, in the last score of years. One of the most interesting discussions was on the neglected science of entomology, in which it was estimated that American farmers lost about $300,000,000 every year by the ravages of insects. It was shown that a little practical knowledge of the history and habits of insects would enable farmers to guard against those plagues. The rotation of crops, the use of fertilizers, and the advantages of a fuller knowledge of the character and quality of the soil, were also fully and ably discussed.

The great feature of the Convention, however, and the one destined to produce the largest practical results, was an address by Lieut. M. F. Maury, on the means that should be adopted for predicting the seasons. All countries and all classes should co-operate in a general and systematic course of observations on sea and land so as to foretell the seasons, and to enable farmers to prepare their crops accordingly. It was urged that every ship that sails the ocean, no matter under what flag, should make observations respecting the changes in the air, wind, etc., at stated hours every day; a similar system of observation should be adopted on land, and the whole forwarded to some central point for scientific collation and record. By adopting a policy of this kind, it would be possible in a few years to perfect the science of meteorology, so as to furnish, by means of the telegraph, farmers in all countries with a forecast of the weather and seasons. Information thus gained and distributed would enable farmers to adapt their crops to the peculiarities of the coming seasons, and, by preventing waste of labor and material, would be of incalculable benefit to humanity.

Duties of an Apothecary in the Olden Time.

Dr. D. Campbell Black, in an address on the relations of prescriber to dispenser, before the Glasgow Chemists' Association, quoted from an old work the following quaint rules for an apothecary's life and conduct:—

1. Must fyrst serve God, forsee the end, be clenly, pity the end.

2. Must not be suborned for money to hurt mankynde.

3. His place of dwelling and shop to be clenly, to please the sences withal.

4. His garden must be at hand, with plenty of herbes, seedes, and rootes.

5. To sow, set, plant, gather, preserve, and keep them in due tyme.

6. To read Dioscorides to know ye nature of plantes and herbes.

7. To invent medicines, to choose by colour, taste, odoar, figure, etc.

8. To have his mortars, stilles, poltes, filters, glasses, boxes, clene and sweette.

9. To have charcole at hand to make decoctions, syrups, etc.

10. To keep his cleane ware close and cast away the baggage.

11. To have two places in his shop, one most cleane for the physic, and a barer place for the chirurgeric stuff.

12. That he neither increase or diminish the physician's file (*i.e.*, prescription), and keep it for his own discharge.

13. That he neither buy nor sell rotten drugges.

14. That he peruse often his waares that they corrupt not.

15. *That he put not in quid pro quo* (*i.e.*, use one ingredient in place of another when dispensing a physician's prescription) *without advysement*.

16. That he may open well a vein for to help pleurisy.

17. That he meddle not in his vocation.

18. That he delight to reade Nicolaus Myrepsus, Valerius Cordus, etc.

19. That he do remember his office is only to be physician's cooke.

20. That he use true weight and measure.

21. To remember his end and the judgement of God; and thus do I commend him to God, if he be not covetous and crafty, setting his own lucre before other men's help, succour, comfort, etc.

Detection of Vitriol in Vinegar.

The following process will, says the American *Journal of Pharmacy*, detect the 500th part of free sulphuric acid, and is accurate for all practical purposes. An ounce of the vinegar to be examined is reduced by evaporation on a water bath to about half a drachm, or the consistency of a thin extract; when quite cold, half a fluid ounce of strong alcohol is added, and thoroughly incorporated; the free sulphuric acid will be taken up by the alcohol, to the exclusion of any sulphates; the alcoholic solution should stand for several hours, and then be filtered; add to the filtrate one fluid ounce of pure distilled water, and evaporate the alcohol off by the application of a gentle heat; the remaining liquid is then left for several hours, and again filtered; to the filtrate, previously acidulated with a few drops of pure hydrochloric acid, a solution of chloride of barium is added, which, if sulphuric acid be present, will yield a white precipitate.

Rendering Wood Incombustible.—A very excellent way to render wood incombustible is to soak it in a strong solution of alum and the sulphate of copper. About one pound of alum and one of sulphate of copper should be sufficient for one hundred gallons of water. These substances are dissolved in a small quantity of hot water, then mixed with the water in the vessel in which the wood is to be steeped. The timber to be rendered fireproof can be kept under the liquor by stones or any other mode of sinking it. All that is required is a water-tight vessel of sufficient dimensions to hold enough of the liquor to cover the timber, which should be allowed to steep for about four or five days. After this, it is taken out and suffered to dry thoroughly before being used. A plan of rendering the wood partially fireproof would be to whitewash it two or three times. You will probably require a glue to hold against fire; here is the recipe:—"Mix a handful of quicklime in four ounces of linseed oil, boil them to a good thickness; then spread it on tin plates in the shade, and it will become exceedingly hard, but may be easily dissolved over the fire, and used as ordinary glue."

Trusty, industrious men, in all avocations, are in demand at all times. Bear this in mind, young men. Also, while you are at it, bear in mind that business men look with serious distrust upon persons whose habits are bad, and who spend much of their time in idleness. When such a young man, or old one either, for that matter, seeks employment, he will find himself known, and in many cases plainly told why he is not given work. Business men are obliged to keep themselves posted in regard to the characters of persons in their employ. Young men, learn the importance of commencing life correctly.

The Charcoal Respirator.

STENHOUSE'S charcoal respirators, invented in 1854, are now coming into use in manufactories and laboratories. They have been found peculiarly efficacious in protecting workmen from mercurial and other noxious metallic fumes, and have been largely employed for that purpose by the Borneo Company in their quicksilver works at Sarawak. They have also been found very useful in absorbing the fumes of chloride of sulphur, so largely used in vulcanizing india-rubber, and in stopping hydrochloric acid and sulphurous acid gases, and also the vapors of bromine and iodine.

They do not effectually stop chlorine, but the inventor states that they may be made to do so in the following simple manner:—The respirator is suspended for ten or fifteen minutes over some strong solution of ammonia in a large beaker; in this way the charcoal absorbs a very large amount of ammoniacal gas. It is then taken out and exposed to the air for a short time until the excess of ammonia has been removed, when it will be found that the wearer can remain for a considerable time in an atmosphere containing chlorine without suffering any inconvenience.

The Inventor of Puddled Steel.

ANTON LOHAGE, the inventor of puddled or wrought steel, died on April 21, at Unna, in Westphalia. Being the son of a poor peasant, he was sent to an elementary school, and when twelve years of age he entered the service of a richer peasant as sow-herd, and passed through all the stages of an agricultural laborer. When twenty-one years old, he went to work at a factory, and developed there such skill and capacity that he was sent for two years to the factory school at Hagen, where Director Grothe improved him so much that he could be sent with advantage to the Polytechnic School of Berlin, where he studied for three years, and supported himself partly by a small burse which was granted him, partly by working as a chemist in a factory. In 1848 he began his trials at the Haspe Iron-works, near Hagan, in Westphalia, and after some time he succeeded in producing steel of good and uniform quality by the ordinary puddling process. His invention was patented, 1850, in England by Ewald Riepe, and introduced at Low Moor; but owing to the quality of the pig-iron, its use was very limited in England, until, in 1858, Mr. William Clay introduced the process on a large scale at the Mersey Steel and Iron Works, Liverpool. In Germany about 100,000 tuns of puddled steel are made every year, and it forms the principal material for Krupp's celebrated cast steel.

The Beer Business.—Extract of Hops.

THE consumption of malt liquors is constantly increasing in this country. Mr. Henry Clausen, in the opening address before the Brewers' Congress now in session in New York, stated that in the United States there are more than three thousand breweries, giving employment to thousands of people and representing $100,000,000 of capital. These breweries consume 23,000,000 bushels of barley and 18,000,000 pounds of hops, which require for their cultivation over a million acres of land, thus becoming an important item in our agricultural interests. The direct and indirect revenue paid into the Treasury through the manufacture and sale of malt liquors has steadily and rapidly increased; in 1863 it was $1,500,000, in 1870 it was $6,600,000, and last year it had reached the enormous sum of $7,800,000.

These facts and figures remind us to state that within a recent period Prof. Charles A. Seeley, a well-known chemist of this city, has patented a method of manufacturing the extract of hops, by the use of which the hop is greatly economized. Several experimental brewings have been made in this city, which have demonstrated that the use of the extract gives a gain of from ten to fifteen per cent. over that obtained by the use of the crude hop. Here is an improvement that promises to open a new and extensive business.

PRINCIPLES OF FLIGHT.—The result of the experiments with apparatus for obtaining the data of the fundamental principles of aeronautics were reported at the recent meeting of the Aeronautical Society in London. The experiments were carried out at Messrs. Penn's Engineering Works by the Experimental Committee appointed by the Council of the Aeronautical Society of Great Britain to determine the relation between the velocity of the atmosphere and its pressure upon plane surfaces of varying dimensions and degrees of inclination. The instrument and experiments were made by Mr. Wenham and Mr. Browning. Mr. Wenham, in the absence of the latter, explained the nature of the instrument used. The experiments were considered to establish a law that the lifting force of inclined planes, carried horizontally through air, was increased in the direct ratio that the sine bears to the length of the plane, or the height of the incline to the base. Thus, if instead of stating the angles in degrees, they said "one in ten," or "one in three or four," as the case might be, this would at once express the proportion in which the lifting force exceeded the resistance. The average of all the results was very near to this, making a little allowance for the surface friction of the plane through the air. At 45° the two forces were equal; above that, the proportions were in inverse ratio, as the lifting force was less than the direct. It had been stated that the resistance of wedges or cones through the air was diminished directly in the ratio that the height or diameter of the base bore to the length of the cone. The experiments did not confirm this, but showed the resistance to be less in proportion as the angle became more acute. The chairman, Mr. Brook, and a few others made some remarks, and a vote of thanks was given to the Messrs. Penn for the assistance they had rendered in making the experiments. Mr. Head read a paper "On Flight," the object of which it was to show that it was possible for man to fly through the air if a proper machine were made for that purpose. Mr. Head seems to have come to this conclusion from observations on the flight of birds.

A NEW HYGROMETER.—Those who have attended chemical lectures will remember that marks made on paper with chloride of cobalt are almost invisible, but that on exposing the paper to warmth —as, for instance, holding it in front of a fire—the marks at once become visible. This change is owing to the varying color of this salt under variations of moisture and temperature. This property of the chloride of cobalt to change its color has also been applied to the preparation of such chemical toys as fire-screens, in which portions of the views by which they are illustrated appear or disappear according as they are warmed or cooled. It is now proposed to employ it in the construction of an hygrometer which shall, by its changes in color, indicates changes in the quantity of moisture in the air.

Hereditary Influences.

IT is distinctly asserted by Prosper Lucas, and agreed to by others, that predisposition to any form of disease, or any malformation, may become an inheritance. Thus disease of the heart is hereditary; so are tubercles in the lungs; so also are diseases of the brain, of the liver, and of the kidney; so are diseases of the eye and of the ear. General maladies are equally inheritable, as gout and madness. Longevity on the one hand, and premature death on the other, go by descent. If we consider a class of peculiarities more recondite in their origin than these, we shall still find the law of inheritance to hold good. A morbid susceptibility to contagious disease, or to the poisonous effects of opium or of calomel, and an aversion to the taste of meat, are all to be found inherited. So is craving for drink, or for gambling, strong sexual passion, a proclivity to pauperism, to crimes of violence, and to crimes of fraud.

There are certain marked types of character justly associated with marked types of feature and temperament. We hold, axiomatically, that the latter are inherited (the case being too notorious and too consistent with the analogy afforded by brute animals to render argument necessary), and we therefore infer the same of the former. For instance, the face of the combatant is square, coarse, and heavily jawed. It differs from that of the ascetic, the voluptuary, the dreamer, and the charlatan.

Still more strongly marked than these are the typical features and characters of different races of men. The Mongolians, Jews, Negroes, Gipsies, and American Indians severally propagate their kinds; and each kind differs in character and intellect, as well as in color and shape, and form a class of instances worthy of close investigation, in which peculiarities of character are invariably transmitted from the parents to the offspring.—*Francis Galton.*

MANY ladies are puzzled how to get rid of the detestable worms that will infest the earth in their flower-pots. The following recipe which we find in an exchange is recommended to destroy the pests:—"Put one ounce of ammonia to one gallon of warm water, and water the plants with it once a week; they will be free from these worms, and will make the plants grow, and be beautiful and green. To kill the little bugs that get on the oleander, take a piece of lime the size of a hen's egg, and dissolve it in about two quarts of water, and wash the stock and branches of the tree; they will disappear.

HASCHISCH INSTEAD OF OPIUM.—Malzen states that the nations of the Turkish Empire and in the north of Africa are far more addicted to the use of the haschisch, cannabis indica, than to that of the opium. They have a similar effect, yet the former is decidedly preferred. They use either the dried leaves for smoking, or they drink the pressed juice, either in form of a prepared essence, or consume the latter in form of cakes soaked with that essence. The cannabis indica is a variety of our hemp, cannabis sativa.

AN experiment is about to be tried in England, the result of which should be carefully watched here. The iron-clad *Hotspur* has been detailed to discharge a number of 500 pound shot against the revolving turrets of the iron-clad *Glatton*, in order to test the real strength of the revolving turrets, the advantages and disadvantages of the system, and other points which can only be settled by actual experiment.

DECISION OF THE COMMISSIONER OF PATENTS.

JOHN M. CORNELL.—*Appeal.*

[*Appeal from the Primary Examiner in the matter of the application of John M. Cornell for Letters-Patent for* IMPROVEMENT IN MACHINES FOR SHEARING THE ENDS OF IRON BEAMS.—*Decided June* 4, 1872.]

PRACTICE UNDER RULE 44—WORDING OF CLAIMS—AMBIGUITY—SHOULD A PATENT COVER A MEANS OR AN ACT?

A claim should be the *means* by which an operation is accomplished or effect produced, and not to the *act* of accomplishing or producing.

The fact that courts may or will construe liberally, and thus save loosely-drawn claims, does not justify this Office in allowing such.

A function is not patentable.

It is not a matter of indifference whether an applicant clearly ascertains the exact matter of novelty; the public has a right to know the exact limitations of a patentee's monopoly.

By ambiguous descriptions the public may be deceived and defrauded; therefore the Office demands clearness and accuracy.

LEGGETT, *Commissioner :—*

After describing his machine, the applicant adds his claim in the following language:—

"Preparing the end of the beam, as described, in a machine fitted with a web-cutter, *n*, and flange-cutters, *h*, *h*, made substantially as described, and combined and operated with reference to each other to cut away the flanges and trim the end of the web, substantially as set forth."

To this the examiner objects on the ground that the claim is for an act and not for the means of accomplishing a result.

I have no doubt but that, if allowed, the courts would, by liberal construction, save this claim. The reference to the mechanism would enable a court in its efforts to save a patent to so construe the claim as to make it embrace the means by which the ends of beams are prepared, although in terms the claim is for preparing the ends of beams.

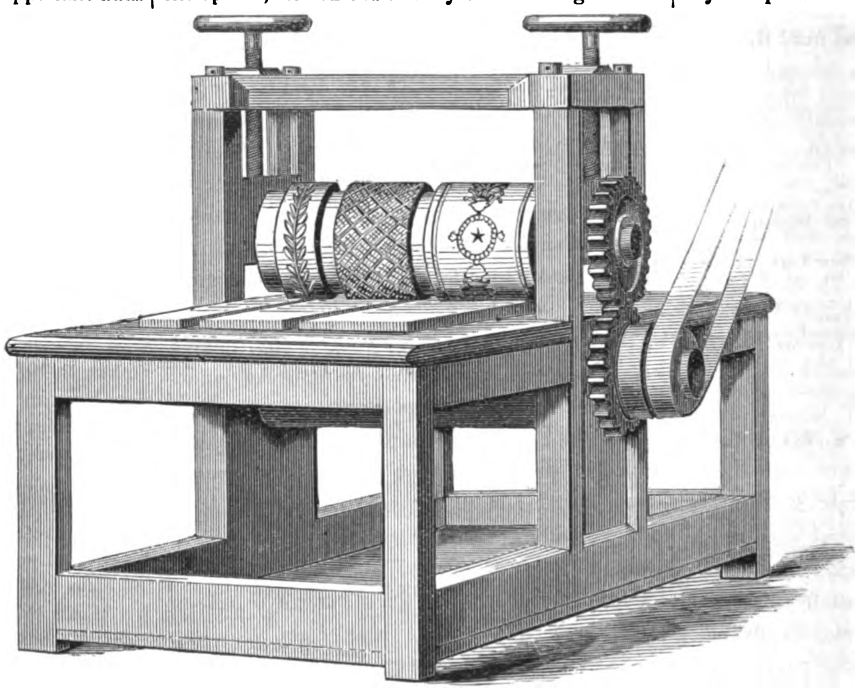
The fact that the courts will construe loosely-drawn and ambiguous claims so as to save a patent, if possible, is no valid reason for allowing such claims, and is no justification of attorneys in pressing them upon the Office.

The 26th Section of the Patent Law provides that, in case of a machine, "the applicant shall particularly point out and distinctly claim the part, improvement, or combination which he claims." The claim in question 'distinctly' claims only a function, and that is not patentable. If the patentee were the only person interested, there would be some propriety in allowing his claim to pass without question as to its form. He might then have the largest liberty in using ambiguous and doubtful phraseology. But such is not the case. The public has a right to know the exact limitations of a patentee's monopoly, and for that reason the law requires distinct, exact, and sharply defined claims. Ambiguous descriptions and loosely-drawn claims are often sought for the purpose of public deception, and, when obtained, have been unscrupulously used in swindling schemes. In this way the public has often been injured, and the whole patent system brought into disrepute. While the Office should exercise the largest liberality toward inventors as to subject-matter, yet justice to meritorious inventors and public policy alike demand great clearness and accuracy in specifications and claims, and upon this the Office must insist.

The decision of the examiner is sustained.

Mechanical Wood-carving.

IN a recent number of "Les Mondes," the Abbé Moigno gives an interesting account of an invention by M. H. A. Lanteigne, of Rue de la Fauvette, at Tours, and Rue Thérèse, Paris, which has for its object the cheap and effective adaptation of wooden surfaces to ornamentation, by a process which the inventor and patentee calls "mechanical sculpture on wood," from the clearness, sharpness, and delicacy of the resulting work; although in effect it partakes more of the character of embossing or raised surface printing.



MECHANICAL WOOD CARVER.

As regards the decorations obtained by sculpture on wood, it may be said that they have not shared in the general progress characteristic of the present epoch; and this is mainly due to the great difficulty of effecting mechanically the necessary action of the tools for the production or reproduction of designs of ornamentation, whether in relief or intaglio. The cost of work of this kind has therefore remained high, and substitutes have been sought in various plastic materials, inferior in solidity and other respects. The simple and ingenious invention of M. Lanteigne successfully supplies a great desideratum, substitutes reality for imitation, and operates mechanically, at trifling cost, sculptures in wood otherwise expensive.

The results are obtained without charring or any preliminary treatment or preparation of the wood; and the harder and drier the wood, the better is the effect. The work is done by the simple agency of pressure in the operation of rolling; the material being passed between a bed-plate and a matrix cylinder, on the surface of which the desired pattern or design has been cut. The annexed engraving represents one of the machines, and needs but little explanation. The only change effected in the wood is an increase of solidity and density, while, even with manual power, the delicacy and relief of the sculpture obtained rival the products of the most skilled carver, excepting, as a matter of course, that undercutting is not possible.

These machines are constructed on different types at a cost varying from £25 to £100. Each of them requires necessarily a variable number of matrices of different patterns and prices, which may be estimated at 200 as ample for all ordinary requirements, and costing from £2 to £10 each. These, like the rolls of the iron manufacturer, can be continually varied in device and extended to any number.

The process is capable of an infinitude of applications in the whole range of details of ornamental joinery, which it is needless to specify; also, to the covering of books and albums, frames for pictures and photographs, cylindrical, circular, and arched objects, relief portraits, vignettes, imitative wicker-work for panels, etc., etc., etc. Experience has shown that ornamental surfaces may thus be produced at the rate of 10 square feet per second, which is, of course, independent of the elaboration or simplicity of the pattern; and it will be evident therefrom that there cannot be any comparison of cost with hand-carving.

Architects and authorities of taste and judgment in France have confidently pronounced this to be the richest industrial product that has been seen for ten years past.

The few specimens that have been forwarded to our offices are sufficient to give practical evidence of the beauty of the work and the importance of the invention from an industrial point of view.

ELECTRIC LIGHT.—Since the invention of Grove's battery, that and Bunsen's modification of it have been almost exclusively used for the electric light. These, as far as high electromotive force and smallness of resistance are concerned, are preferable to any other; but there are great objections to the use of them in the necessity for discharging them frequently, and in the emission of acid fumes, which cannot but be injurious to the person who discharges the battery, and which are very destructive to apparatus unless the battery be kept in a special chamber. The battery employed in Glasgow University, and which gives great promise of being really successful, is a modification of Daniell's battery.

FACTS ABOUT TACKS.—The length of tacks, as understood and given by the manufacturers, is by the "ounce," which is printed on the label, and stenciled on the box or package in which the goods are placed for transportation. "Three ounce" (3 oz.) means that the package so labeled contains tacks three-eighths inch long, and that for every three ounces of tacks of that length there should be 1,000 tacks. Four ounce would be seven-sixteenths inch long; six ounce, eight-sixteenths; eight ounce, nine-sixteenths inch long, and for each "full-weight" package thus labeled there should be 1,000 tacks, and so on up to twenty-four ounce, which likewise is equivalent to one and a quarter inches long, and 1,000 tacks.

A NEW green pigment, said to be brilliant, is composed of twenty parts of oxyd of zinc and one of sulphate of cobalt, mixed into a paste with water, and exposed to a red heat.

AMERICAN ARTISAN

BROWN & ALLEN, Publishers,

ISSUED WEEKLY AT

No. 189 Broadway, New York.

H. T. BROWN. L. ALLEN.

AGENTS.

AMERICAN NEWS COMPANY, New York City; NEW YORK NEWS COMPANY, New York City; NEW ENGLAND NEWS COMPANY, Boston; A. WINCH & Co., Philadelphia; H. TAYLOR & Co., Baltimore.

WEDNESDAY, JUNE 26, 1872.

CONTENTS OF THIS NUMBER.

[Illustrations are indicated by an asterisk.]

THE AMERICAN ARTISAN TO BE ENLARGED.

THE next number of the AMERICAN ARTISAN will appear in new dress and considerably enlarged. We do not, however, propose to rest with this improvement. As soon as warranted by increased circulation, we shall take another step in advance. As all the improvements made in our paper benefit our readers, we trust they will feel like helping us along by their personal influence. By calling attention to the value of the paper and its remarkable cheapness, many may be induced to subscribe for it. An essential enlargement of a paper is attended with expense and labor little appreciated by those uninitiated into the mysteries of publishing, but we hazard this adventure in full confidence that we shall be sustained through the co-operation of our friends. The first number of the paper as enlarged will, we think, be pronounced a handsome one; but we have more and better in store. For the many kind notices from our professional brethren already bestowed, and for such notices as they may give the ARTISAN enlarged, we are and shall be deeply grateful.

BACK VOLUMES OF THE AMERICAN ARTISAN.

WE are prepared to supply bound volumes of the AMERICAN ARTISAN to order. The price per volume, with the exception of Vol. I., Old Series, and Vol. I., New Series, is $2 25. Most of the volumes can be supplied unbound if purchasers prefer; the price for each unbound volume being $1 00. The price of Vol. I., Old Series, is $3 50; the price of Vol. I., New Series, is $10 00. These last being nearly exhausted, command a higher price than the others. The volumes of the enlarged form we are about to adopt will be distinguished by the term "Third Series."

CANADIAN PATENTS FOR AMERICANS.

IN our last issue, we stated that the amendment to the Canadian Patent Law, providing for the granting of patents to American and other non-residents on the same terms as to resident Canadians, had passed, and would come into force on the first of September next. We are now able to state definitely the more important provisions of the amended law, so far as they affect American inventors.

If the invention is already the subject of a patent in the United States, the application for the Canadian patent must be filed within one year after the date of the American patent. The invention must not have been in public use or on sale for more than one year previous to the application in Canada. The patent may be obtained by the inventor or his assignee, but not by a mere importer or introducer.

The Government fees are twenty dollars in gold or Canadian currency for five years; forty dollars for ten years; sixty dollars for fifteen years. The fees for the extension of a patent from five to ten years are twenty dollars; ten to fifteen years, twenty dollars; from five to fifteen years, forty dollars. The agency fees on the extension will be small.

The agency charges of the "American Artisan Patent Agency," including those of the Canadian agent, whom it is necessary to employ for the transaction of that portion of the business which must be done in Canada, will be fifty dollars, in United States currency, for an application the specification and drawings of which involve an ordinary amount of labor. When we receive orders at the same time for an American and a Canadian patent, we may be able to make some reduction from these charges. A model or specimen must be furnished by the applicant.

We desire to impress upon American inventors the advisability of intrusting the business of applying for Canadian patents to none but such agents as are perfectly competent. The Canadian agents of the "American Artisan Patent Agency" are gentlemen who have for years held the leading position in their own country, and all persons who give us their Canadian business may rely upon its performance in the most thorough and expeditious manner.

INDEX NUMBER.

THE present being our index number, we have three pages less of ordinary reading matter than usual, and, of course, a smaller variety in contents. The title page and index are necessary only once in six months, and in the enlarged form our first number shall more than make amends for any lack of interest in this. Our inside pages, however, contain an able essay from the pen of Capt. John Ericsson, of great interest and value to scientific readers. The engravings and description of Duff's marine governor, on our first page, will attract the attention of engineers and mechanics, and we trust the general reader will find something to interest him elsewhere.

PATENT OFFICE DECISION.

A DECISION of the Commissioner of Patents, published on another page, contains some useful information as to the way in which patent claims should be made, and insists upon clearness and accuracy. We hope that the Patent Office will enforce the practice here laid down, that when a person gets a patent the public as well as he may know just what it secures to him.

CHANGES IN THE PATENT OFFICE.—A NEW LAW FIRM.

GEN. SAMUEL A. DUNCAN, who, since the passage of the law of 1870 creating the Assistant Commissionership of Patents, had filled that important position, and who had for some time previous performed duties corresponding with those of the Assistant Commissioner, has recently resigned, for the purpose of forming a law partnership with Hon. S. S. Fisher, formerly Commissioner of Patents, and W. H. Fisher. The new firm is Fisher & Duncan, of New York and Cincinnati. Gen. Duncan is located in New York, W. H. Fisher in Cincinnati, and Hon. S. S. Fisher in one city and the other as business may require.

The vacancy created by Gen. Duncan's resignation is filled by Mr. J. M. Thatcher, from the Board of Examiners-in-Chief, and Gen. Ellis Spear, for several years examiner of the civil engineering class, has been promoted to the Board.

HEALTH OF NEW YORK.

SEVERAL weeks since, we called attention to the disgusting state of the streets in various parts of New York. Since that time nothing material has been done toward removing the filth, and what was then more offensive to sight than smell has in the hot sun become revolting to every sense.

With this state of things the mortality rate is fearfully increasing. Pestilence is hospitably invited, doctors and undertakers thrive, while those whose means permit are hastening to desert the city for the purer air of the rural resorts.

If the streets are to be purged of their pollution at all, the cleansing process should not be delayed another day, and, once begun, it should be prosecuted with the utmost vigor. There are streets, and slums, and dens of infection too numerous to name, into which tuns of disinfectants might be dumped, even after all that hoes and shovels, brooms and carts, can collect is removed.

There has been promise of better things in the removal of the former contractor and the substitution of a man supposed to be more conscientious and efficient, who, with the co-operation of the police, would, it was hoped, soon render the city a more suitable dwelling-place for civilized humanity. But as yet little if anything has been done to show the advantage of the change, and it is feared nothing short of a pestilential visitation will arouse the public to an indignation that will compel the officials to do their duty.

THE BURDEN OF TAXATION.

EVERY citizen owes a measure of support to the Government, the payment of which is his burden of taxation. In a recent article, we maintained that, under the present organization of society in which the "civilized" way of supporting the government is employed, and the attempt to proportion individual burdens to individual ability is assumed to be made, each person pays in proportion to what he consumes and wastes, and not according to what he produces. We maintained, also, that this is an inevitable result of the fixed principles of trade and commerce. Before we close the present article, we'shall endeavor to show that nothing could be more wise or more productive of good results to the commonwealth than this effect of general taxation.

Before we do this, we will state that some—among whom is Mr. Henry Carey Baird, the well-known publisher of industrial books and a profuse writer upon social questions—take issue with us in the above proposition, and hold that it is production alone that pays taxes.

In one of Mr. Baird's essays we find the following:—"As all of the people of this country must ultimately live off or from the product of American production, so must all taxes, national, State, and local, ultimately fall upon American producers, and upon them alone, unless we can make foreigners who seek our markets, and enjoy the advantages and profits thereof, pay a portion of these taxes." Let us briefly examine this statement.

We admit that all the people of the United States must live off or from the productions of the United States; but it is precisely by the consumption and waste (waste is one form of consumption) of these products that they live. There are thousands of drones who produce nothing, but who consume much, and waste more. We may nominally tax the producers of the necessaries and luxuries the drones devour; but if we do, the producers will tax the drones indirectly through increase of the price they set upon their products, and thus draw from the consumers the tax which they hand over to the government. The producers are, therefore, intermediate tax-collectors. As every producer is perforce a consumer, he must, of course, pay tax; but he pays it in proportion to what he withdraws from the general stock of wealth, and not according to what he adds to it. If Mr. Baird's proposition be true, idlers escape taxation, and a premium is offered to sloth. Instead of encouraging industry, a tariff upon articles of necessity and luxury must be a burden upon production. Mr. Baird knows that this is not the effect of a tariff. He knows that while a tariff entails some slight inconvenience to producers in carrying out the intent of the law, and in transferring the burden only nominally borne by them, it does not embarrass general industry. He would be the very last man to admit this, and yet it is the logical sequence of the proposition that "production bears the burden of taxation."

And this leads us to consider the wisdom of making consumption and waste pay the taxes. Surely, if it were sought to promote individual economy and lessen the drains upon the general resources of a country, this could have no other than the desired effect. How was it when gold-cased watches were taxed? The use of the cheaper silver watch was enforced upon many. Those by whom silk had been commonly used before the present high tariff upon the importation of the latter adopted perforce a cheaper article of dress; and so we might go on to show by numerous examples that the proper method of taxation will always tend to habits of economy in the masses without embarrassing production. The more we produce, and the less we consume and waste, the richer we get. Is that not correct, Mr. Baird?

Mr. Gladstone on Science and Religion.

YESTERDAY a large and influential meeting was held at Willis's Rooms—the Archbishop of Canterbury in the chair—for the purpose of aiding a fund which has been set on foot to relieve King's College from the heavy load of debt by which it has been oppressed from its very foundation.

Mr. Gladstone, who was received with very warm applause, began by some general remarks. He then proposed the first resolution, as follows:—

That King's College, recognizing the great principle of religious education (while at the same time it provides against any infringement of religious liberty), deserves the confidence and support of all who accept religion as the basis of true education.

The right hon. gentleman, in the course of his remarks, observed: Probably few of the founders of this institution, when they chose for its basis the union of science with religion, little dreamed, in their boldest or in their most sanguine anticipations, what a depth of meaning would be given to those words within the lifetime of many of those who were watching their work. The union of science with religion! Forty years ago that was the motto of King's College; it is its motto still; and it will ever continue to be so. [Cheers.] But what have we seen? We have seen that which in many of its characteristics we must reckon as open war between those who profess to be allies and co-operators in the great work of human improvement. Even among ourselves we must not conceal the fact that of late years a fearful change has taken place. I do not mean to insinuate that knowledge and science have done harm to religion—they never have done it, and they never can. [Loud cheers.]

If harm has arisen, if conflict has taken place between the professors of science and the professors of religion, the fault lies not in the thing that is professed, but in those who profess it. It lies in their want of a true appreciation of what they profess. It lies, not in the promulgation of science or of religion, but in the promulgation, as science or religion, of that which is not science or not religion. [Cheers.] For my own part, I believe that the resources of science, of history, and of sound and just criticism, so far from tending to shake the foundation of belief, will not only afford new evidence in its support, but will sustain the authenticity and enhance our estimate of the value of its sacred records. [Cheers.]

But we must not disguise from ourselves the present state of opinion on the subject; for there may be people who, in their distress, and even despair, about the alliance between science and religion of which I have spoken, may be disposed in some evil moment to surrender the attempt at its realization. When I look abroad I cannot conceal from myself that, in the largest of Christian communions, events have lately taken place of portentous significance with regard to this question. Admitting the incapacity of my understanding to grasp the full purport of what has taken place with respect to the recent decree at Rome, I must own it appears to me much to resemble a proclamation of perpetual war against the progress of the human mind.

On the other hand, what do I see among ourselves? I am not speaking of the uninstructed classes of society; but I see lying on the tables of drawing-rooms, in the best type and binding, works that speak of Christianity as an antiquated superstition, fit for no purpose but to comfort the least intelligent and the least instructed portion of mankind. I will not make allusion to any one in particular, because it would be invidious to do so; but in a work which I admit to be of great interest and ability, and which I have recently read, I find the writer discussing the manner in which there have arisen in great crises of human history individuals of such exceptional gifts and powers as seem to have been set apart for the purpose of taking the lead. The writer says that their apparition is not uniform, but he admits that it is not uncommon; and he says it is so remarkable that it would have been perfectly allowable to term it providential in prehistoric times. [A laugh.] That is said without the smallest notion that he is giving utterance to anything of a startling character. It is mentioned as a kind of commonplace. It would seem that in his view there was a time when mankind were so ignorant that they might, without forfeiting the title of rational creatures, believe in Providence; but that since that period another and greater power has arisen in the world, and that under the name of science it has gone to war with Providence, so that now we have the happiness of living in an age when Providence is no longer to be treated as other than an idle dream. [Cheers.]

If there is any truth in the motto of the institution whose cause we are advocating to-day, I would say that it is not science at all. It is a rash, precipitate, narrow, self-informed manner of dealing with these subjects; and this rash habit of drawing from narrow premises broad conclusions would confine us to one of two terrible alternatives—either to give up the investigation of nature, with all those rich materials for knowledge and enjoyment which are to be derived from it, or to give up all hope in the world that is unseen.

I believe that a more terrible imposture never threatened the happiness of mankind—[loud cheers]—and that the way to encounter that imposture is by the serious and practical maintenance of the truths by which it is to be detected and exploded. I believe that this is to be done not merely by verbal propositions, but by such practical measures as the foundation of such institutions as King's College—institutions which, in the largest and soundest sense, aim at promoting the happiness of mankind. [Loud cheers.]—*Watchman.*

VORACITY OF THE PICKEREL.—The rapid growth and extraordinary voracity of the pickerel are well shown by Dr. Sturtevant in the report of the Massachusetts Inland Fisheries Commissioners. The doctor investigated their powers of eating in the following manner:—He put two young pickerel, five inches long, in a trough with a great quantity of little minnows about one inch in length; and these two pickerel ate 128 minnows the first day, 132 the second, and 150 the third, and they increased one inch in 48 hours! They were mere machines for the assimilation of other organisms.

THE Signal Service weather reports, which were only intended originally for the benefit of commerce, have proved so useful to the agricultural interests of the country also, that Congress has authorized the War Department to extend the working of the system so as to provide specially for these interests by the collection of reports from various points in the interior.

NEW AMERICAN PATENTS.

UNDER this head we shall give a weekly summary of the more important American and English Patents.

APPARATUS FOR VAPORIZING AND BURNING HYDROCARBONS.—S. J. Whiting, Philadelphia, Pa.—*June* 11.—A steam-pipe body and oil pipe are so constructed and combined that a portion of the steam acts as an injector, and another portion acts as an auxiliary jet. The body has a longitudinal partition forming two passages in connection with an opening in said partition, the oil pipe and the steam pipe communicating with the two passages.

HOISTING APPARATUS.—W. C. Williamson, Philadelphia, Pa.—*June* 11.—In this apparatus the operations of throwing out of contact the friction or gear wheels, the braking of the drum-shaft, and shutting off steam are accomplished simultaneously by a single lever.

MANUFACTURE OF TUBING.—J. B. Forsyth, Boston, Mass.—*June* 11.—This invention consists in covering a flexible tube with a seamless tube, formed by braiding a tube of strands over the flexible tube while the latter is extended by a water mandrel. The strands are immersed at the point where they unite in rubber cement. The process is not only patented, but the tubes, as a new article of manufacture, are made the subject of a claim.

JOURNAL-BOX.—G. R. Meneely, West Troy, N. Y.—*June* 11.—This journal-box, patented as a new article of manufacture, is composed of a wrought-iron jacket and an inner bearing surface of brass, bronze, or other hard metal, the two being united by casting.

PREPARING CRUDE CAMPHOR FOR THE PRESERVATION OF FURS, ETC.—W. F. Simes, Philadelphia, Pa.—*June* 11.—This is a process of forming crude camphor into cakes or blocks by compression, and the tablets or cakes are patented as a new article of manufacture.

LIGHT-INTENSIFYING APPARATUS FOR GAS-BURNERS.—S. T. Bacon, Boston, Mass.—*June* 11.—This attachment consists of a glass lens in combination with a frame or other support, adjustable so that the lens may be set in the desired position relatively to the flame.

METALLIC PISTON-ROD PACKING.—C. S. Barry, assgr. to H. Blundell, agent, Providence, R. I.—*June* 11.—In the stuffing-box are placed metallic sections, fitted so as to embrace the piston-rod and to break joints. These sections are pressed upon the piston-rod by steam, in combination with a gland and an interior packing-case provided with ports.

RIFLE BARREL.—M. S. Colvin, East Randolph, N. Y.—*June* 11.—This invention consists in a system of rifling consisting of a series of grooves or channels and corresponding rounded shoulders with one short and one long side, both being curved, but the curve of the larger side having a radius considerably greater than that of the bore of the barrel.

LIQUID SOAP OR DETERGENT.—J. Leitch, London, England.—*June* 11.—This compound consists of soluble glass, sugar, and chalk, with or without other ingredients not considered essential, but which may be added to give color, perfume, or other desirable qualities to the compound.

SEWER BASIN TRAP.—L. A. Gouch, Yonkers, N. Y.—*June* 18.—This invention relates to traps to be placed within the basins or wells of sewers for preventing the escape of obnoxious air or gases from the sewer, without restricting, or at least necessarily so, the ventilation of the well. To this end an upright pipe, open above as well as below, to provide an upper outlet in case of the lower outlet from the basin becoming choked, is connected intermediately of its height with the sewer pipe. The invention consists in means and peculiarities of construction connected with the upright pipe, whereby the latter, without the aid of a float or valve, is sealed against the escape of effluvia at or through its top by reason of a water-joint at such portion, and such outlet kept clear or open for water from the well, when rising in the latter by the choking of the lower outlet, but not admitting of dust, dirt, or obstacles entering the upright pipe from above.

STOVE-PIPE ATTACHMENT.—C. Bellamy and J. G. Brotherwell, Wolcottville, Conn.—*June* 18.—This invention consists in the combination with standards or uprights, which are attached either directly to a stove-pipe or by strap surrounding it, and are provided with sockets, of swinging shelves or rails, or both shelves and rails, supported in said sockets, whereby articles, arranged on the shelves or rails, may be kept warm or dried by being in proximity with the stove-pipe, said shelves or rails being capable of adjustment nearer to or further from the stove-pipe, to provide for heating the articles on them more or less.

TIN-CUTTING MACHINE.—C. R. Merriam, Middlebury, Vt.—*June* 18.—This invention consists in certain novel and advantageous combinations and arrangements of devices and particular constructions of certain parts, in a machine for cutting tin plates or sheets applicable to the manufacture of culinary vessels and for other purposes, whereby, while simplicity is combined with durability, the machine may readily be adapted to do different kinds of work, and juvenile labor may be employed to operate it.

CIGAR-MAKING MACHINE.—H. Erfurth, Crimmitschau, Saxony.—*June* 18.—This invention relates to that class of machines used in the manufacture of cigars for making bunches, and it consists principally in a cylindrical roller, having two cavities formed in its surface, one for the reception of fillings, and the other for the reception and convenient discharge of the finished bunch, said roller being arranged at the under side of a table, and projecting partially through an opening therein, and being operated in connection with an apron secured to it substantially as described.

OFFICIAL LIST OF PATENTS

ISSUED FROM THE UNITED STATES PATENT OFFICE

For the Week ending June 18, 1872,

AND EACH BEARING THAT DATE.

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[*Reported officially for the "American Artisan."*]

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PATENT CLAIMS, DRAWINGS, AND SPECIFICATIONS.—*We are prepared to furnish, by return mail, a copy of the claims of any existing patent, for* - - - - - 75 *cents.*
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ADVICE TO INVENTORS AND PATENTEES.

We will promptly send, gratis, our recently published pamphlet, entitled "IMPORTANT INFORMATION FOR INVENTORS AND PATENTEES," *containing details of the proceedings necessary to be taken by inventors desirous of obtaining Letters-Patent in the United States. Also, Instructions to Patentees concerning Re issues, Extensions, Infringements, Foreign Patents, etc.*

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127,945.—RAILROAD-CAR HEATER.—T. B. Atterbury, Pittsburg, Pa.
127,946.—REFRIGERATOR.—B. F. Averill, assgr. of one-half of his right to L. L. Hyde, Dunkirk, N. Y.
127,947.—PROCESS FOR SOFTENING DRY HIDES.—J. Barron, Cincinnati, Ohio.
127,948.—CLOTHES-DRIER.—J. R. Bassett, assgr. to F. Wegelin, Cincinnati, Ohio.
127,949.—RULER.—J. M. Batchelder, Cambridge, Mass. Ante-dated June 13, 1872.
127,950.—HOT-AIR JACKET FOR MARINE STEAM-BOILERS FOR HEATING PURPOSES.—J. W. Beach, Buffalo, N. Y.
127,951.—STOP-VALVE.—R. Beaumont, Momence, Ill.
127,952.—MILK-COOLER.—A. Beeman, assgr. to H. C. Beaman Potter's Corners, Pa.
127,953.—PROCESS FOR PURIFYING IRON, STEEL, AND OTHER METALS.—J. F. Bennett, Pittsburg, Pa.
127,954.—KNITTING MACHINE.—J. L. Branson, Chicago, Ill. Ante-dated June 8, 1872.
127,955.—PROCESS OF CLEANING AND RENOVATING COFFEE.—W. H. Butler, assgr. of one-half of his right to F. Hawkins, Chicago, Ill.
127,956.—MOLD FOR CASTING WHISTLES.—E. Clator, Wheeling, West Va. Ante-dated June 4, 1872.
127,957.—EVAPORATING AND CONCENTRATING SULPHURIC ACID.—W. T. Clough, assgr. to D. Dodd, Newark, N. J.
127,958.—REFRIGERATOR AND SODA APPARATUS COMBINED.—J. M. Cohen, Bloomfield, Iowa.
127,959.—DOOR-BELL.—J. P. Connell, Kensington, Conn.
127,960.—ROOFING-BRACKET.—A. J. Connelley, Philadelphia, Pa.
127,961.—APPARATUS FOR LOADING CATTLE UPON CARS.—L. O. Cottle, Cedar Rapids, Iowa.
127,962.—CABINET BEDSTEAD.—M. Crosby, Boston, Mass.
127,963.—SELF-EXTINGUISHING LAMP.—J. J. Cuthbert, assgr. of one-half of his right to J. F. Neely, Duckport, La.
127,964.—MANUFACTURE OF SOLES AND HEELS FOR BOOTS AND SHOES FROM HIDES.—C. H. Dedrick, Philadelphia, Pa.
127,965.—AIR-TIGHT JOINTS FOR GAS-RETORTS.—C. F. Dieterich and A. Schüssler, New York City.
127,966.—MOLDING FOR COFFINS, ETC.—G. S. Eaton, Williamsburg, N. Y. Ante-dated June 1, 1872.
127,967.—EXTENSION BRACKET.—W. S. Elliott, Goshen, N. Y.
127,968.—LIFTING JACK.—W. C. Ellis, Patriot, Indiana.
127,969.—VISE.—G. M. Evans, Pittsburg, Pa.
127,970.—PLOW.—A. B. Farquhar, York, Pa.
127,971.—MANGLE.—R. Gage, Kingston, Canada.
127,972.—ELECTRO-MAGNETIC REGULATOR FOR INCUBATORS.—J. Graves, Reading, Mass.
127,973.—SCREEN FOR COAL-GAS PURIFIERS.—J. Hale, Georgetown, Mass.
127,974.—SHIRT-BOSOM.—G. Harrington, Springfield, Mass.
127,975.—CURTAIN-FIXTURE.—W. B. Hazzard, Philadelphia, Pa.
127,976.—REVOLVING CANISTER FOR TEAS, ETC.—W. M. Hoyt, Chicago, Ill.
127,977.—COMBINED PORTABLE FURNACE AND WASH-BOILER.—H. Humphreville and T. Humphreville, Lancaster, Pa.
127,978.—POSTABLE MUSIC-STAND.—A. Iske, assgr. to J. Spillinger, Lancaster, Pa.
127,979.—CAR-BRAKE.—W. Kimball, Woburn, Mass.
127,980.—CHAIR AND STEP-LADDER COMBINED.—A. Liesche, Syracuse, N. Y.
127,981.—HARVESTER.—C. W. Marsh and W. W. Marsh, Sycamore, Ill.
127,982.—SPOOL-CASE FOR SEWING-MACHINES.—T. Merrick, Holyoke, Mass.
127,983.—PREPARATION FOR THE HAIR.—N. T. Ormsby, Chicago, Ill.
127,984.—STEAM SIPHON-PUMP.—T. O'Rorke, Pittsburg, Pa.
127,985.—CARDING MACHINE.—D. Pheteplace, Lewiston, Me.
127,986.—PAVEMENT.—S. C. Prescott, Jersey City, N. J., assgr. to H. Smith, New York City, and Jemima Prescott, Jersey City, N. J.
127,987.—FENCE-POST.—C. Putnam and L. S. Totman, Casadaga, N. Y.
127,988.—LOCOMOTIVE SPARK-ARRESTER.—J. Radley, Brooklyn, N. Y.
127,989.—CANDLESTICK.—A. E. Rogers and G. W. Webb, La Grande, Oregon.
127,990.—MACHINE FOR SQUARING THE ENDS OF BOARDS.—E. H. Rollins, Bangor, Maine.
127,991.—BEE-HIVE.—M. B. Shaw, Zionsville, Iowa.
127,992.—COMPOSITION FOR PAVEMENTS.—H. F. Snow and J. H. Davis, Dover, N. H.
127,993.—SPITTOON FOR RAILROAD-CARS.—H. Stanley, St. Johnsbury, Vt.
127,994.—SMOKE-HOUSE.—J. W. Story, Louisville, Ky.
127,995.—APPARATUS FOR BOILING BONES, REFUSE MEATS, ETC.—R. W. Thing, assgr. to N. Ward & Co., Winchester, Mass.
127,996.—MALLEABLE IRON BRAKE-SHOE.—J. J. Torley, assgr. to himself, W. McConway, W. Dilworth, Jun., and J. Heath, Pittsburg, Pa.
127,997.—SASH-BALANCE.—J. W. Trussell, Augusta, Maine.
127,998.—PARING-KNIFE.—G. H. Vickroy, Washington, D. C.
127,999.—COMBINED CORN HARVESTER AND HUSKER.—T. F. Vincent, assgr. of one-half his right to G. Buchman, Rock Island, Ill.
128,000.—BLEACHING AND CLARIFYING GLUE, GELATINE, AND SIZE.—N. J. Wells, Holyoke, Mass.
128,001.—APPARATUS FOR REMOVING TIN FROM TINNER'S WASTE.—T. F. Wells, New York City.
128,002.—JOURNAL-BOX.—D. Whitlock, Newark, N. J.
128,003.—BREWER'S CASK.—J. Wiley, Alleghany City, Pa.
128,004.—GAS AND AIR HEATING OVEN.—G. F. Wilson, Providence, R. I.
128,005.—BEE-HIVE.—H. Alley, Wenham, Mass.
128,006.—THRASHING AND SEPARATING MACHINE.—W. H. Bassett, Burlington, Kan.
128,007.—PLANING MACHINE.—C. B. Beall and J. K. Leach, assgrs. of one-third of their right to J. E. Hull, Hamilton, Ohio.
128,008.—WAX-THREAD SEWING-MACHINE.—E. E. Bean, assgr. to the Consolidated Wax-thread Sewing-machine Co., Boston, Mass.
128,009.—SHIP'S PUMP.—T. Bell, Bellport, N. Y.
128,010.—TOBACCO-KNIFE.—W. A. Bernard, Danville, Va.
128,011.—LOZENGE PACKAGE.—H. W. Booth, Toronto, Canada.
128,012.—HAY RAKER AND LOADER.—C. C. Brandt and J. C. Shillook, New Ulm, Minn.
128,013.—BATTER-MIXER.—A. Burdict, Middletown, Conn.
128,014.—BUNG.—T. Burke, New York City.
128,015.—GUN-LOCK.—J. J. Byers, Delta, N. Y.
128,016.—WOOD STOVE.—C. H. Castle, assgr. to Comstock, Castle & Co., Quincy, Ill.
128,017.—SHUTTLE FOR SEWING-MACHINES.—F. A. Churchill, Pittsfield, Mass.
128,018.—TOY STEAM LOCOMOTIVE.—F. W. Clark, New York City.
128,019.—WHIP-SOCKET.—H. W. Comstock, assgr. to T. Comstock & Co., Columbus, Ohio.
128,020.—ICE-PICK AND MEAT-MAUL COMBINED.—T. A. Conklin, New Britain, Conn.
128,021.—PAPER-CUTTING IMPLEMENT.—J. Cook, Grand Manan, Canada.
128,022.—LAMP FOR COOKING APPARATUS.—S. Cooper, Washington, D. C.
128,023.—CARPET.—G. Crompton, Worcester, Mass.
128,024.—SAWING MACHINE.—W. J. Cunningham, London, England.
128,025.—HARNESS-SADDLE.—E. Dixon, Emporia, Kansas.
128,026.—PROCESS OF TREATING ORES OF COPPER, ETC.—C. M. T. Du Motay, Paris, France, and W. Hillegeirt, Clausthal, Hanover.
128,027.—DYEING WITH MADDER COLORS.—A. C. Duncan and A. Duncan, Manchester, England.
128,028.—REFRIGERATOR.—S. A. Dunnington, New York City.
128,029.—BARBER'S CHAIR.—J. N. Ewald, Frankfort, Ind.
128,030.—HEMP-BRAKE.—P. S. Fitch, Ky.
128,031.—FLOUR-SIFTER.—T. I. Fontaine, New Madrid, Mo.
128,032.—PLOW.—G. G. Foreman, Stockton, Ga.
128,033.—FEED-WATER HEATER.—J. Gates, Portland, Oregon.
128,034.—WORK-HOLDER.—W. F. Gilbert, Derby, Conn.
128,035.—DRAUGHT-REGULATOR FOR HOT-AIR FURNACES.—S. J. Gold, Cornwall, Conn.
128,036.—BASKET.—J. Graham, Vassar, Mich.
128,037.—BUCKLE.—J. B. R. Hardeman, assgr. to himself and E. W. Foster, Tehuacana, Tex.
128,038.—COMBINED BUREAU AND CLOTHES-DRIER.—W. Hathaway, Northbridge, assgr. to himself and C. Hastings, Millbury, Mass.
128,039.—MACHINE FOR MOLDING FLOWER-POTS AND OTHER POTTERY.—F. Herrmann, Milwaukee, Wis.
128,040.—ROUND BELTING.—A. Holbrook, Jun., assgr. to A. & C. W. Holbrook, Providence, R. I.
128,041.—SUPPORT FOR CANOPIES, CURTAINS, ETC.—J. B. Holmes, Philadelphia, Pa.
128,042.—CONVERTING IRON INTO STEEL.—E. F. Houghton, Philadelphia, Pa.
128,043.—SPRING BED-BOTTOM.—H. F. Howell, Mt. Pleasant, Iowa.
128,044.—ARM-REST FOR CAR-SEAT FRAMES.—T. S. Hudson, Cambridge, Mass.
128,045.—VISE.—J. L. Isbell, Naugatuck, assgr. to C. Parker, Meriden, Conn.
128,046.—STRAW-CUTTER.—L. M. Johnson, Hillsborough, Ohio.
128,047.—CAR-COUPLING.—A. J. Jourde, Houston, Tex.
128,048.—LAMP-BASE.—J. Kintz, Meriden, assgr. to himself and P. J. Clark, West Meriden, Conn.
128,049.—GUN-SIGHT.—J. T. La Rue, Pleasant Post-office, Ind.
128,050.—TOOL FOR DRESSING MORTISES.—C. E. Littlefield, Carver's Harbor, Maine.
128,051.—MANUFACTURE OF TENSION-WHEEL FOR SEWING-MACHINES.—I. Manning, Philadelphia, Pa.
128,052.—CHECK-REIN RUNNER.—A. P. Mason, Franklinville, N. Y. Ante-dated June 1, 1872.
128,053.—WASHING MACHINE.—E. McCoy, Pontiac, Mich.
128,054.—BOAT-DETACHING APPARATUS.—D. McFarland, New York City, assgr. to Adaline M. Ingersoll, Brooklyn, N. Y.
128,055.—INNER SOLE FOR SHOES.—J. E. McIlhenney, Philadelphia, Pa.
128,056.—HAND CORN-SHELLER.—A. McLean and J. H. Ross, Carondelet, Mo.
128,057.—MACHINE FOR MAKING BLINDS.—J. Milne, Philadelphia, Pa.
128,058.—SIGNAL-LANTERN.—J. W. Moffitt, Harrisburg, Pa.
128,059.—HOP PRESS.—F. Homburg, Burlington, Wis.
128,060.—MACHINE FOR ROSSING LOGS.—G. W. Nichols, Clinton, Iowa, assgr. to himself and F. A. Schulenburg, St. Louis, Mo.

128,061.—Plow.—J. Oliver, South Bend, Ind.

128,062.—Rotary Steam-engine.—C. W. Patten, Elk Point, D. T.

128,063.—Stove-pipe Connection.—C. R. Penfield, asgr. to himself and C. Strawn, Lockport, N. Y.

128,064.—Clamp.—J. H. Phillips, Troy, N. Y.

128,065.—Shoe-fitting Machine.—W. H. Pruden and J. P. Benjamin, Williamsburg, N. Y.

128,066.—Distress Rudder and Drag.—H. Rablen, New York City.

128,067.—Harrow.—G. Reed, Greencastle, Ind.

128,068.—Reach-coupling for Wagons.—W. P. Ripley, Friendship, Tenn.

128,069.—Propelling and steering Canal-boats.—P. Roberts, asgr. to himself and W. A. Rees, New York City.

128,070.—Bee-hive.—W. H. Roberts, Campbell's Station, Tenn.

128,071.—Device for cutting Screw-threads.—F. G. Robinson, Pittsfield, Mass.

128,072.—Bee-hive.—A. I. Root and M. Andrews, asgrs. to A. I. Root & Company, Medina, Ohio.

128,073.—Bag-holder.—J. Roseborough, Jun., South Hermitage, Pa.

128,074.—Door-bolt.—J. B. Sargent, New Haven, Conn.

128,075.—Latch for Gates, etc.—G. N. Sharp, La Plata, Mo.

128,076.—Washing Machine.—J. J. Smith and C. B. Camp, Middlebury, Ind.

128,077.—Waste-pipe Trap.—T. Smith, New York City.

128,078.—Toy-gun.—G. Stackhouse, Mount Washington, Pa.

128,079.—Process of rendering Sail-duck, Awning canvas, etc., Proof against Mildew.—R. C. Sturges, Boston, Mass

128,080.—Churn.—T. Stumm, Ada, Ohio.

128,081.—Coating or Electro-plating Iron, Brass, Copper, etc., with Tin.—W. E. Tilley, Middlesex County, England.

128,082.—Key-hole Guard for Locks.—J. B. Whitney, New York City.

128,083.—Bolt-heading Machine.—C. D. Wiley and M. S. Norton, Junction, Minn.

128,084.—Car-axle.—E. H. Williamson, Philadelphia, Pa.

128,085.—Machine for drying Paper, Wadding, etc.—E. C. Wilson, Medway, Mass.

128,086.—Water-heater and Steam-generator.—G. M. Woodward, New York City.

128,087.—Plow-clevis.—E. A. Wright, Fort Madison, Iowa.

128,088.—Process of purifying Iron and Copper.—K. W. Zenger, Prague, Austria.

128,089.—Eaves-trough Fastening.—J. P. Abbott, Cleveland, Ohio.

128,090.—Cream-saver.—O. Abell, asgr. of one-half of his right to R. D. Fellows, Witoka, Minn.

128,091.—Water-elevator.—N. Adams, Iowa City, Iowa.

128,092.—Screw-clamp Support for Rock-drill Spindles.—G. Allen, Waterford, N. Y. Ante-dated June 12, 1872.

128,093.—Finger-brush for cleaning Teeth.—G. M. Allerton, asgr. to Goodyear's India-rubber Glove Manufacturing Co., Dover Plains, N. Y.

128,094.—Magnetic Bath-tub.—J. R. Anderson, New York City.

128,095.—Spark-arrester.—T. A. Andrews, Jun., Philadelphia, Pa.

128,096.—Folding-square.—J. T. Baker, Brooklyn, N. Y.

128,097.—Attachment for Wash-boilers.—C. Beach, Rochester, N. Y.

128,098.—Flexible Division for Seats.—T. J. D. B ck, Washington, D. C.

128,099.—Attachment for Stove-pipes.—C. Bellamy and J. G. Brothwell, Wolcottville, Conn.

128,100.—Molasses Jug and Pitcher.—W. Bennett, Baldwin Township, Pa.

128,101.—Moccasin Boot and Shoe.—F. A. Bishop and F. G. Bishop, Bangor, Maine.

128,102.—Milk-cooler.—B. C. Bort and T. Bryant, Chateaugay, N. Y.

128,103.—Railroad-car Heater.—E. Bradley and J. G Fulghum, asgrs. of one-third of their right to M. G. Phillips, Nashville, Tenn.

128,104.—Cotton-press.—W. Bradley, asgr. to West Point Foundry Co. and W. C. & L. Lanier, West Point, Ga.

128,105.—Railway Switch.—M. Brockway, Jun., asgr. to himself and L. Gillett, Jonesville, Mich.

128,106.—Soldering-iron.—C. Brombacher, Tarrytown, N. Y.

128,107.—Furniture-caster.—J. D. Browne, Madisonville, Ohio.

128,108.—Table-leaf Support.—D. Bull, Amboy, Ill.

128,109.—Bottle and Transportation Case.—C. Burnham and J. G. Taite, Philadelphia, Pa.

128,110.—Medical Compound.—M. H. Campbell, asgr. of three fourths of his right to A. H. Matson, E. F. Butterfield, and W. H. Hubbard, Syracuse, N. Y.

128,111.—Privy-seat.—H. W. Carpenter, Madison County, N. Y.

128,112.—Fruit Can and Jar.—J. K. Chase, Brooklyn, asgr. of one-half his right to G. W. Corey, New York City.

128,113.—Sewing-machine Carriage.—G. H. Chinnock, New York City.

128,114.—School-seat Joint.—S. C. Clark, asgr. to C. G. Harrington, Northville, Mich.

128,115.—Pivot-bridge.—T. C. Clarke, Philadelphia, and A. Bonzano and J. Griffin, Phœnixville, asgrs. to Clarke, Reeves & Co., Philadelphia, Pa.

128,116.—Post-office Box Front.—C. J. Clements, asgr. to himself and E. P. Fowler, New York City.

128,117.—Slide-valve.—J. M. Coale, Baltimore, Md.

128,118.—Machine for forming Wrench-bar Heads.—A. G. Coes, Worcester, Mass.

128,119.—Clothes-wringer.—D. M. Cole, Elgin, Ill.

128,120.—Railway Track.—J. H. Connelly, asgr. of one-half of his right to J. C. Tilton, Pittsburg, Pa.

128,121.—Automatic Gate for Railways.—H. Conrad, New Columbia, Pa.

128,122.—Tinner's Furnace.—W. H. H. Coon, St. Paul, Minn.

128,123.—Pump.—P. Cope, Oakfield, N. Y.

128,124.—Corn-sheller.—H. W. Cornell, Owego, N. Y.

128,125.—Mounting Pictures.—Emma L. Courtney, Philadelphia, Pa.

128,126.—Well-point Filter.—Deloss A. Danforth and Albert N. Chamberlain, Elkhart, Ind.

128,127.—Axle for Vehicles.—R. Daniels, Woodstock, Vt., asgr. of one half of his right to Z. C Robbins, Washington, D. C.

128,128.—Eaves-trough Hanger.—D. Dimmick, Orwell, Pa.

128,129.—Caster.—J. N. Dinsmore, Kendall's Mills, Maine.

128,130.—Gun-carriage.—J. B. Eads, St. Louis, Mo.

128,131.—Printing-telegraph.—T. A. Edison, Newark, N. J.

128,132.—Device for cooling Mill-burs.—E. Embrey and T. J. Blackburn, West Liberty, Ohio.

128,133.—Cigar Machine.—H. Erfurth, Crimmitschau, near Leipsic, German Empire.

128,134.—Machine for distributing Nails for the Manufacture of Boots and Shoes.—H. D. Fairfield, Boston, Mass.

128,135.—Self-lubricating Axle-box.—C. D. Flint, asgr. of one-half of his right to H. A. Moore, New York City.

128,136.—Composition for Paint.—W. H. Foran, Boston, Mass.

128,137.—Fishing-reel.—A. H. Fowler, Batavia, N. Y.

128,138.—Sewer-basin Trap.—L. A. Gouch, Yonkers, N. Y.

128,139.—Apparatus for drying Wall-paper, etc.—N. Hall, Philadelphia, Pa.

128,140.—Grain thrasher and Separator.—J. H. Hamaker and C. Frease, Wilmot, Ohio.

128,141.—Plow.—W. K. Harrell, asgr. to himself, T. B. Chamberlain, and D. C. Chamberlain, Clarinda, Iowa.

128,142.—"Shove-under" for Rolling Mills.—J. B. Hastings, Ironton, Ohio.

128,143.—Machine for winding Ribbons, etc.—M. Hayes, Owego, N. Y.

128,144.—Oil-can.—L. W. Hemp and J. Z. Skinner, St. Louis, Mo.

128,145.—Wire-fence.—T. Hill, Jun., Sturgis, Mich.

128,146.—Sheet-metal Elbow.—H. S. Hoeller and C. Hoeller, Cincinnati, Ohio.

128,047.—Peg-cutter.—E. Holmes, Lynn, Mass.

128,148.—Printing Show-cards.—W. C. Hutchins, Hartford, Conn.

128,149.—Blackboard-eraser.—F. G. Johnson, Brooklyn, N. Y.

128,150.—Potato-digger.—L. Johonnott, Burlington, Vt.

128,151.—Coke-oven.—T. G. Kenny, Prospect, Pa.

128,152.—Safety-device for Elevators.—P. P. Lane, asgr. to Lane & Bodley, Cincinnati, Ohio.

128,153.—Dark Lantern.—T. Langston, Meriden, Conn.

128,154.—Washing Machine.—A. Lavine and F. Oclair, Webster, Mass.

128,155.—Device for handling Fire-engine Hose.—J. Lowe, Washington, D. C.

128,156.—Fluting Machine.—J. W. Madden and J. Dodsworth Buffalo, N. Y. Ante-dated June 8, 1872.

128,157.—Fence.—C. Maltby, deceased, by B. Maltby, administrator, asgr. to J. S. Maltby, Glenwood, N. Y.

128,158.—Double-seaming Machine.—W. H. McGann, Hartford, Vt.

128,159.—Tin-cutting Machine.—C. R. Merriam, Middlebury, Vt.

128,160.—Way-cock.—S. P. Mervine, Jun., Philadelphia, Pa.

128,161.—Slide-valve.—H. H. Meyer, Denver, Col.

128,162—Stove-pipe Shelf.—L. C. Millard, St. Louis, Mo.

128,163.—Inkstand.—K. Morgan, Springfield, Mass.

128,164.—Mechanical Toy.—E. E. Newell, Bristol, Conn.

128,165.—Car-pushing Device.—R. Odenath, Philadelphia, Pa.

128,166.—Metal Pipe and Tube for conveying Water, Gas, and other Fluids.—D. D. Parmelee, New York City.

128,167.—Lubricator.—C. H. Parshall, Detroit, Mich.

128,168.—Fluting Apparatus.—F. B. Perkins, Elgin, Ill.

128,169.—Medical Compound or Bitters.—Elizabeth Phillips, Peoria, Ill.

128,170.—Box.—W. M. Pierce, Sandusky, Ohio.

128,171.—Adjustable Back for Carriage-seat.—E. A. Rice, Wilmington, Vt.

128,172.—Sewing-machine.—G. A. Richardson, Reading, Mass.

128,173.—Machine for shaping the Springs of Light Carriages.—L. H. Richardson, Westfield, Mass.

128,174.—Steam-heater for Railroad-cars.—G. B. Riggins, asgr. to himself and A. Van Horn, New York City.

128,175.—Spring Bed bottom.—J. L. Secomb, Chicago, Ill.

128,176.—Package for putting up Caustic Alkalies, Acids, etc.—J. H. Seibert, Philadelphia, Pa.

128,177.—Wire-cloth for Coal-screens.—C. P. Seitzinger, Scranton, Pa.

128,178.—Mode of propelling Vehicles, Traction Engines, etc.—H. Sells, Vienna, Canada.

128,179.—Setting for Hot-air Furnaces.—C. J. Shepard, Brooklyn, N. Y.

128,180.—Setting for Hot-air Furnaces.—C. J. Shepard, Brooklyn, N. Y.

128,181.—Attachment for Sewing-machines.—P. L. Shepler, Whitehouse, Ohio.

128,182.—Car-coupling.—W. P. Siddens, asgr. to himself and R. Craig, Danville, Ill.

128,183.—Gate.—L. Slinger and D. Slinger, Carmi, Ill.

128,184.—Manufacture of Tension Eye-bars for Bridges.—F. H. Smith, Baltimore, Md.

128,185.—Wash-boiler.—H. H. Smith, Bainbridge, Pa.

128,186.—Reciprocating Steam-engine.—S. Smith, Little Rock, Ark.

128,187.—Washing Machine.—O. Snell and A. S. Snell, asgrs. of one-half of their right to J. Boyd, Williamsburg, Ohio.

128,188.—Base-burning Stove.—J. M. Thatcher, Jersey City, N J.

128,189.—Wood-sawing Machine.—C. A. Towar, Detroit, Mich.

128,190.—Planing Machine.—A. Van Haagen, asgr. to himself and C. Van Haagen, Philadelphia, Pa.

128,191.—School-seat.—I. S. Wachob, Scranton, Pa.

128,192.—Hydrant.—J. Walsh, Philadelphia, Pa.

128,193.—Wall-papering Machine.—A. Weiss, Newport, Ky.

128,194.—Machine for cutting Cloth.—G. Westerhauser, asgr. to himself and C. W. Broadbent, Brooklyn, N. Y.

128,195.—Thread-cutter and Thimble combined.—B. M. Wilkerson, Tuscaloosa, Ill. Ante-dated June 12, 1872.

128,196.—Pump-piston.—P. Zeiher, asgr. to himself, J. Rahn, J. Wolf, and H. Stahl, Pomeroy, Ohio.

128,197.—Grain-separator.—A. Zwiebel, Burlington, Wis.

128,198.—Medical Compound.—J. Cahn, Selma, Ala.

128,199.—Apparatus for the Manufacture of Gas from Oils.—C. Gearing, Pittsburg, Pa., and F. A. G. Gearing, Houston, Texas.

128,200.—Window-frame.—A. McGuire, Coatesville, Pa.

RE-ISSUES.

4,947.—Chain-elevator and Bucket.—J. A. Ball, Grass Valley, Cal. Patent No. 96,866, dated Nov. 16, 1869.

4,948.—Prairie Plow.—C. M. Clark, Seward, Neb. Patent No. 125,936, dated April 23, 1872.

4,949.—Portable Bath.—E. J. Knowlton, Ann Arbor, Mich. Patent No. 100,297, dated March 1, 1870.

4,950.—Soldering Apparatus.—F. L. Miller, Brooklyn, N. Y. Patent No. 120,991, dated Nov. 14, 1871.

4,951.—Apparatus for the Manufacture of Pasteboard.—H. L. Palmer, asgr. to E. W. O'Neill and M. Fitzgibbons, Stillwater, N. Y. Patent No. 87,359, dated March 2, 1869.

4,952.—Seed-planter.—J. D. Willoughby, Washington, D. C. Patent No. 19,222, dated Jan. 26, 1858; extended seven years.

4,953.—Apparatus for sinking Pneumatic Piles.—F. E. Sickels, Chicago, Ill. Patent No. 99,360, dated Feb. 1, 1870.

DESIGNS.

5,937.—Badge.—G. F. Crook, Cambridge, Mass.

5,938.—Shutter-bar.—W. Gorman, asgr. to Russell & Irwin Manufacturing Co., New Britain, Conn.

5,939.—Bell-crank and Rose.—W. Gorman, asgr. to Russel & Irwin Manufacturing Co., New Britain, Conn.

5,940.—Reclining-settee.—M. D. Jones, Boston, Mass.

5,941.—Picture.—E. Metcalf, Norristown, Pa.

5,942.—Cigar-boxes.—G. Moebs and J. B. Thiesen, asgrs. to Burk, Moebs & Co., Detroit, Mich.

5,943.—Skating-muff.—R. M. Seldis, New York City.

TRADE-MARKS.

861.—Cement.—Black Diamond Cement Company, Louisville Ky.

862.—Cement.—Falls City Cement Co., Louisville, Ky.

863.—Varnish.—C. F. Hollwede, New York City.

864.—Gloves.—K. Luckemeyer, New York City.

865.—Cleansing Powder.—M. H. M. Magan, Plainfield, N. J.

866.—Fertilizers.—Southern Fertilizing Co., Richmond, Va.

867.—Tin-lined Lead-pipe.—The Colwells, Shaw & Willard Manufacturing Co., New York City.

868.—School-books, Maps, etc.—University Publishing Co. New York City.

EXTENSIONS.

20,441.—Machine for making Horse-shoes.—C. H. Perkins, June 1, 1858; re-issued March 3, 1863; No. 1,424.

20,519.—Tailor's Pressing Machine.—L. B. Storrs, June 8, 1858.

20,527.—Planing Machine.—J. A. Woodbury, June 8, 1858.

20,538.—House-bell.—J. Barton (C. A. Buell and Margaretta L. K. Barton, administrators of said J. Barton, deceased), June 15, 1858.

8,778.—Machine for printing Floor-cloths.—S. Savage, March 2, 1852; extended by Commissioner of Patents for seven years from the 2d day of March, 1866; again extended seven years from the 2d day of March, 1873, by act of Congress, approved June 10, 1872.

EXTENSIONS REFUSED.

20,539.—Machine for cutting Glazier's Pins.—J. G. Baker, June 15, 1858. Refused June 13, 1872.

20,566.—Adjustable Hangers for Shafting.—W. Johnson, June 15, 1858. Refused June 13, 1872

20,571.—Door-locks.—J. R. Marston, June 15, 1858. Refused June 11, 1872.

ENGLISH PATENT JOURNAL.

LIST OF APPLICATIONS FOR PATENTS

ON WHICH

Provisional Protections

HAVE BEEN OBTAINED IN ENGLAND BY OR FOR AMERICAN INVENTORS.

[*This list is condensed weekly from the "Journal of the British Commissioners of Patents," expressly for the* "American Artisan."]

1,341.—Improvement in vises.—A. P. Stephens, Brooklyn, N. Y.—May 8, 1872.

1,501.—Wood-cutting machinery, etc.—J. Richards, Philadelphia, Pa.—May 16, 1872.

1,572.—Slide-valve.—G. Westinghouse, Jun., Pittsburg, Pa.—May 23, 1872.

1,574.—Manufacturing sheet-iron.—Rogers and T. J. Burchfield, Alleghany, Pa.—May 23, 1872.

1,576.—Car-coupling.—C. L. Horack, Winona, Minn.—May 23, 1872.

1,584.—Propelling ships, etc.—L. B. Bruen, New York City.—May 23, 1872.

1,564.—Machine for making pins.—T. B. De Forest, Birmingham, Conn.—May 22, 1872.

1,565.—Machine for sticking pins in paper.—T. B. De Forest, Birmingham, Conn.—May 22, 1872.

1,590.—Beds of railroads.—Boone & Herman, San Francisco, Cal.—May 24, 1872.

1,568.—Improvement in hubs.—W. Lyman, East Hampton, Mass.—May 22, 1872.

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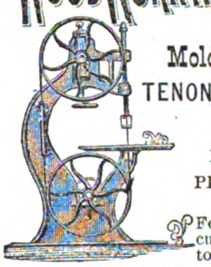

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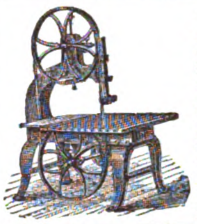

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